

National Association of State Consumer Advocates (NASUCA)

**Developing a Unified Inter-carrier Compensation Regime
CC Docket No. 01-92**

**Comments on
Further Notice of Proposed Rulemaking -- March 23, 2005**

Affidavit of

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On Behalf of

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¹ I would like to thank Steven Burns, Scott Kennedy, Mark Kosmo, David Bergman, Billy Jack Gregg, and Robert Loube for their valuable inputs and contribution to this affidavit.

I. Overview Of The Affidavit

1. The Commission is considering whether to adopt Bill-and-Keep as the foundation for its access and interconnection charging policies. I will address how the use of Bill-and-Keep is flawed from a number of perspectives. I have prepared this Affidavit on behalf of the National Association of State Utility Consumer Advocates (NASUCA).
2. In fact, as far back as 2001, the Commission's predilection towards adopting Bill-and-Keep was apparent:

In this *NPRM*, we envision that a bill-and-keep regime would fulfill the goals of the two interim measures, combined with the larger goal of a unified regime.²

3. Currently call termination costs are recovered from the originating party under a calling party pays (CPP) principle. Under bill-and-keep, which is a form of receiving party pays (RPP)³ terminating costs would be recovered from the receiving party through either usage-sensitive rates (e.g. a per minute rate for each terminating minute) or a flat-rate charge. It is important to keep three points in mind when considering the efficacy of bill-and-keep:

- ❖ Recovery of Terminating Costs -- The commission has previously recognized that the collection of non-traffic-sensitive costs through a usage-sensitive terminating charge will likely severely retard usage on the public switched network. The Commission is currently considering approving the recovery of the cost of call termination through a flat-rate end-user charge.⁴ This proposition is a complete reversal of the Commission's contention that usage-sensitive costs should be recovered through usage rates and non-traffic-sensitive (NTS) costs through a fixed line charge. The commission's FNPRM does not examine in detail the argument that bill-and-keep should not be adopted because it may result in the economically inefficient outcome of recovering traffic-sensitive costs through a non-traffic-sensitive rate.
- ❖ Caller ID -- The commission recognizes that a usage-sensitive termination charge is problematic because customers may have

² In the Matter of Developing a Unified Inter-carrier Compensation Regime (CC Docket No. 01-92), Further Notice of Proposed Rulemaking, April 21, 2001, Paragraph 4.

³ See footnote #99 for a discussion of the relationship of bill-and-keep to RPP.

⁴ This would encompass the Inter-carrier Compensation Forum (ICF) proposal which would have a zero originating and terminating rate and the recovery of traffic-sensitive inter-carrier costs through a fixed subscriber line charge.

to pay for calls that have no value to them. The commission suggests that this problem can be overcome by people relying on Caller ID under which people only accept calls for which they want to pay. However, the FNPRM does not address the economic efficiency of Caller ID. I show that Caller ID is an inefficient solution because the price of Caller ID greatly exceeds the economic cost of call termination and therefore could result in a large waste of resources.

- ❖ Customer Preference – Studies of customer preference and usage show that a CPP regime is more effective than RPP. In the past several years, numerous countries have moved to CPP for mobile calling, and none has adopted RPP.

4. The Commission's tentative apparent response to the first point on recovering the costs of call termination is that perhaps costs are becoming increasingly non-traffic-sensitive. However, it offers little evidence to support this proposition, other than a reference to a decision of the Wireline Competition Bureau. I show here that the Wireline Bureau's conclusion was wrong, and that the available evidence suggests that the network is becoming increasingly traffic-sensitive
 - ❖ I do this first by looking at the cost structure of today's workhorse in the public switched network — digital circuit switching machines. Here I present the Commission with the results from an engineering processing model that demonstrates why the network is becoming increasingly traffic-sensitive.
 - ❖ I then turn to present cost estimates for the next evolution in switching technology -- packet switching. Here too, I show that the traffic-sensitive costs are significant, contrary to the unsupported assumption of the FNPRM.
 - ❖ Finally, I address the evolution of the network and specifically the economic characteristics of interconnected high-speed networks that are used to provide voice, data, and entertainment services.
5. For all three situations, I show that the wholesale traffic-sensitive costs are significant, and therefore a significant inefficiency would result from recovering the traffic-sensitive costs through a flat-rate end-user charge.
6. In summary, Bill-and-Keep should not be adopted because it is contrary to customer preference, would impede the efficient flow of communications, and could lead to a rate structure that is divorced from the underlying cost structure of the industry.

II. Background And Qualifications

7. I have been a member of the Department of Economics at Queens College since 1987, and am currently a Full Professor. I am also a Visiting Scholar in the Massachusetts Institute of Technology Internet and Telecommunications Convergence Consortium in Cambridge, Massachusetts, and a research fellow of the National Regulatory Research Institute at the Ohio State University. I have consulted widely over the past 20 years for various state commissions, and also internationally in the telecommunications sector.
8. My most relevant work history for this proceeding is my work on the cost structure of the telecommunications industry, some of which is reflected in the Commission's Tenth Report and Order in the USF proceeding;⁵ the assistance that I have provided to State Commissions in UNE cost dockets; and the co-development of the Local Exchange Cost Optimization Model (LECOM) with Mark Kennet. The model has been adopted by many regulatory commissions for estimating the economic cost of service (e.g., the German Regulatory Authority for Telecommunications and Posts), and has been used frequently in scholarly research (e.g., Cost Proxy Models and Telecommunications Policy: A New Empirical Approach to Regulation, Gasmi, Kennet, Laffont, and Sharkey (Cambridge: MIT Press, 2002).

III. A Bill-And-Keep Regime Would Reverse Years Of Policies Aimed At Efficiency Gains

9. In this section, I examine the claimed economic efficiency of proposals -- such as the Inter-carrier Compensation Forum's (ICF) proposal to recover traffic-sensitive costs through a monthly fixed rate subscriber line charge imposed on end users. These proposals are in essence a mandatory Bill-and-Keep regime whereby interconnecting carriers do not pay for the use of each other's networks, and the network costs of each carrier are recovered from that carrier's own retail customers. A bit of foundational history will be useful in framing the discussion to follow.
10. The Commission first started to focus on the means by which an efficient rate structure for intercarrier compensation could be determined at the time of the AT&T divestiture. At that time, the view gaining ascendancy within the Commission was that rates needed to be aligned with costs. A 1984 OPP

⁵ *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket 96-45, Tenth Report and Order, 14 FCC Rcd 20156 (1999) (Tenth Report and Order).

paper by Gerald W. Brock proved seminal, providing the Commission with the intellectual foundation for many of its subsequent access charge reforms.

11. Brock's research for the Commission defines bypass as the "use of alternative facilities between a user's location and the long-distance carrier's Point of Presence (POP) to avoid usage band access charges".⁶ He goes on to point out that after the divestiture of the Bell operating companies from AT&T, access charges were set very high, and that this provided an additional incentive for moderately large business users which did not require full access to the network to bypass switched access service.⁷
12. Moreover, once bypass of switched access facilities occurs, the ILEC must continue to raise access prices to cover revenue requirements. The higher access prices will induce further bypass that could conceivably lead to a situation where the entire network is bypassed if there is no equilibrium access price for which revenue requirements can be met.⁸
13. Following on Brock's arguments, it is clear that the converse is also true: inefficient excess usage can occur if the price of usage is set too low. This could occur when the wholesale usage rate is set below incremental cost, or when the wholesale traffic-sensitive cost of termination is recovered through a Subscriber Line Charge (SLC) on retail customers rather than through usage related wholesale charges. In either case, it is clear from Brock's model that over-utilization of the switched network would occur if the price of usage is set too low. As discussed below, wholesale rates that are too low can also reduce incentives for new network providers to enter the market.
14. Concerning the issues of access pricing, network bypass, and system efficiency, parties from all sectors of the industry have argued, and the Commission has agreed, that as a general rule, costs for interconnection and access should be recovered in a manner that reflects the way they are incurred.⁹

⁶ Gerald W. Brock, Bypass of the Local Exchange: A Quantitative Assessment, Federal Communications Commission Office of Plans and Policy (OPP) Working Paper Series, No. 12, September 1984, Page 1, http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp12.pdf

⁷ Brock, Page 3.

⁸ Brock, Pages 4-5, 8.

⁹ In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 CC Docket No. 96-98 and Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers CC Docket No. 95-185. First Report and Order, released August 8, 1996. (Local Competition Order or LCO) ¶¶742-743.

Access Charge Reform Order, 12 FCC Rcd at 15992-93 Paragraphs 22-23 provide a good overview of the importance of distinguishing between traffic-sensitive and non-traffic-sensitive costs, and the Commission's approach to addressing this issue in an efficient manner. Specifically, in paragraph 23,

15. Specifically, the Commission found that aligning the wholesale rate structure with the manner in which these costs are incurred will:

...ensure requesting carriers have the right incentives to construct and use public network facilities efficiently, and prevent incumbent LECs from inefficiently raising costs in order to deter entry. We note that this conclusion should facilitate competition on a reasonable and efficient basis by all firms in the industry by establishing prices for interconnection and unbundled elements based on costs similar to those incurred by the incumbents, which may be expected to reduce the regulatory burdens and economic impact of our decision for many parties, including both small entities seeking to enter the local exchange markets and small incumbent LECs.¹⁰

16. However, the intercarrier compensation rate structure that first emerged after the AT&T divestiture¹¹ in 1984 did not strictly follow these principles. The Commission sought to allow a gradual transition from the existing monopoly-based access regime, whose wholesale rates allegedly included a number of implicit subsidies, towards its ultimate goal of an access rate regime that could efficiently support facilities-based competition. These cost-based wholesale rates would be achieved when the supposed subsidies were made explicit, and when the rates reflected cost-causation.¹²
17. The Commission has noted in the *Access Charge Reform Order* that “where rates are significantly above cost, consumers may choose to bypass the incumbent LEC’s switched access network, even if the LEC is the most efficient provider. Conversely, where rates are subsidized (as in the case of consumers in high-cost areas), rates will be set below cost and an otherwise efficient provider would have no incentive to enter the market.”¹³

the Commission defines traffic-sensitive costs in the following manner: “The costs of some of these facilities vary depending on the amount of telecommunications traffic that they handle. “

¹⁰ LCO ¶743.

¹¹ 1983 Access Charge Order, 93 FCC 2d at 245-54, ¶¶ 9-35. Here I provide a simple definition of subsidy as Service A is subsidizing other services if service A is paying more than its stand-alone cost of service. Service B, on the other hand, is being subsidized if it is priced below its incremental cost. Under these definitions, the Commission’s use of “subsidy” is economically incorrect without considerably more information.

¹² The transition was done in order to reduce retail rate shocks and promote universal service.

¹³ *Access Charge Reform Order*, 12 FCC Rcd at 15996 Para. 30; see *1998 Notice*, 12 FCC Rcd at 14243 Para. 12.

18. In the Access Charge Reform Order, the Commission continued to change the manner in which price cap LECs recover access costs by attempting to align the rate structure more closely with the manner in which costs are incurred. To that end, the Commission decided to:

...reduce usage-sensitive interstate access charges by phasing out local loop and other non-traffic-sensitive (NTS) costs from those charges and directing incumbent local exchange carriers (LECs) to recover those NTS costs through more economically efficient, flat-rated charges. Because NTS costs, by definition, do not vary with usage, the recovery of NTS costs on a usage basis pursuant to our current access charge rules amounts to an implicit subsidy from high-volume users of interstate toll services to low-volume users of interstate long-distance services.¹⁴

19. In subsequent proceedings, the Commission allowed the SLC to increase as the primary method of meeting its goal of access charge and universal service reform by requiring price cap LECs¹⁵ to recover their non-traffic-sensitive common line costs from end users, instead of carriers, and to recover these costs on a flat-rated, rather than a per minute of use basis.¹⁶

¹⁴ Access Charge Reform Order ¶6. Again, the Commission's use of the term "subsidy" is incorrect.

¹⁵ Similar rule changes were applied to non price cap LECs as well. "In particular, non-traffic-sensitive costs – that do not vary with the amount of traffic carried over the facilities – should be recovered through fixed, flat charges, and traffic-sensitive costs should be recovered through per-minute charges ... For example, cost of the common line or loop that connects an end user to a LEC central office should be recovered from the end user through a flat charge, because loop costs do not vary with usage." In the Matter of Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers, Second Report and Order, CC Docket No. 00-256, released November 8, 2001, FCC 01-304 (MAG Order), ¶17.

¹⁶ See *Access Charge Reform, Price Cap Performance Review for Local Exchange Carriers*, CC Docket Nos. 96-262 and 94-1, Sixth Report and Order, *Low-Volume Long Distance Users*, CC Docket No. 99-249, Report and Order, *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Eleventh Report and Order, 15 FCC Rcd 12962, 12991-93, paras. 76-79 (2000) (increasing SLC caps and phasing out the residential and single-line business PICC) (*CALLS Order*), *aff'd in part, rev'd in part, and remanded in part*, *Texas Office of Public Util. Counsel et al. v. FCC*, 265 F.3d 313 (5th Cir. 2001), *cert. denied*, *National Association of State Utility Consumer Advocates v. FCC*, 535 U.S. 986 (2002); *on remand*, *Access Charge Reform; Price Cap Performance Review for LECs; Low-Volume Long Distance Users; Federal-State Joint Board on Universal Service*, CC Docket Nos. 96-262, 94-1, 99-249 and 96-45, Order on Remand, 18 FCC Rcd 14976 (2003) (*CALLS Order on Remand*). To compensate for the loss of revenues from the elimination of the PICC, the Commission raised the SLC cap for primary residential and single-line business lines from \$3.50 to \$6.50 over a period of several years. See *CALLS Order*, 15 FCC Rcd at 12974-5, 12991-93, 13004-7, paras. 30, 76-79, 105-112. As promised in the *CALLS Order*, the Commission reviewed the network costs of price cap carriers and determined that the SLC increases should proceed as scheduled. *Cost Review Proceeding for Residential and Single-Line Business Subscriber Line Charge (SLC) Caps; Access Charge Reform; Price Cap Performance Review for Local Exchange Carriers*, CC Docket Nos. 96-262 and 94-1, Order, 17 FCC Rcd 10868 (2002), *aff'd Nat'l Ass'n of State Util. Consumer Advocates v. FCC*, 372 F.3d 454 (D.C. Cir. 2004).

20. While the Commission determined that flat-rated charges were appropriate for facilities such as the loop, which is dedicated to a single user,¹⁷ the Commission suggested that the costs of shared facilities, such as portions of switching and transport which have shared capacity constraints, should be recovered in a manner that efficiently apportions costs among all users that share the facility by using any of the following rate structures: a usage-sensitive charge; a usage-sensitive charge for peak-time usage and a lower charge for off-peak usage; or a flat charge for the peak capacity that an interconnector wishes to pay for and use as though that portion of the facility were dedicated to the interconnector.¹⁸
21. In the *Multi-Association Group (MAG) Order* in 2001, the Commission noted that the traffic-sensitive Transport Interconnection Charge (TIC) is not a cost-based element and that it recovered non-traffic-sensitive costs and encouraged network bypass. The Commission stated that:
- as a per minute charge assessed on all switched access minutes, the TIC adversely affects the development of competition in the interstate access market. Competing providers of transport service that interconnect with the public switched telephone network through expanded interconnection must pay this charge regardless of whether they use the incumbent LEC's transport network. Thus, the TIC unduly increases the cost of competitive entry. To the extent that the TIC recovers non-traffic-sensitive costs, it also increases the per minute access charges paid by interexchange carriers and long-distance consumers, artificially suppressing usage of such services and encouraging customers to explore ways to bypass the public switched telephone network.¹⁹
22. The Commission has previously recognized the adverse impacts of Bill-and-Keep, and its tendency to encourage inefficient over-utilization of the network. The Commission's strongest arguments against Bill-and-Keep can be found in

¹⁷ LCO ¶810

¹⁸ LCO ¶753.

¹⁹ In the Matter of Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers (CC Docket No. 00-256), Federal-State Joint Board on Universal Service (CC Docket No. 96-45), Access Charge Reform for Incumbent Local Exchange Carriers Subject to Rate-of Return Regulation (CC Docket No. 98-77), Prescribing the Authorized Rate of Return for Interstate Services of Local Exchange Carriers (CC Docket No. 98-166), Second Report And Order And Further Notice Of Proposed Rulemaking In CC Docket No. 00-256, Fifteenth Report And Order In CC Docket No. 96-45, And Report And Order In CC Docket Nos. 98-77 And 98-166, November 8, 2001, Para 99.

its statements regarding implementation of local competition. In its Local Competition Order the Commission concluded that Bill-and Keep was inefficient and emphasized:

In general, we find that carriers incur costs in terminating traffic that are not *de minimis*, and consequently, Bill-and-Keep arrangements that lack any provisions for compensation do not provide for recovery of costs. In addition, as long as the cost of terminating traffic is positive, Bill-and-Keep arrangements are not economically efficient because they distort carriers' incentives, encouraging them to overuse competing carriers' termination facilities by seeking customers that primarily originate traffic.²⁰

23. Moving to Bill-and-Keep, as proposed by the ICF, would necessarily increase reliance on a flat-rate charge on retail end users to make up for revenue shortfalls and to recover traffic-sensitive wholesale costs. This is regressive taxation at its worst; those customers who use their line for the lowest bandwidth- and resource-intensive service, that being voice, will be taxed the highest, while customers using the network more intensively will be taxed the lowest. To put it another way, an individual who uses the network for voice, data gathering and dissemination, email, data back-up and so on, will pay the same end user charge as a person who uses the network for voice calls only. I would hardly call this a just, fair, equitable, or efficient outcome. This is not the type of scenario the Commission should seek to promote given its commitment to improving efficiency, competition, and maintaining high standards of universal service.

A. The Commission Must Empirically Examine The Impacts Of Bill-And-Keep On The Utilization Of The Network, Competition, And The Revenues Of ILECs

24. Although it is true that many of the Commission's statements on access pricing issues over the past decade have been concerned with excessively high access charges leading to bypassing of the public switched network, I strongly believe the theoretical arguments against excessively low access charges which would arise under Bill-and-Keep are equally compelling. The impact of Bill-and-Keep and the associated low access charges need to be seriously considered by the Commission since they could lead to inefficient use of the public switched network. See, for example, Section VI below where I critique the Commission's suggestion that called parties rely on Caller ID to avoid paying for incoming calls they do not want to receive.

²⁰ Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, 11 FCC Rcd 15499 (1996), paragraph 1112.

25. The ICC proposals that support Bill-and-Keep require the Commission to seek alternative regulatory methods (e.g. higher end-use charges) to ensure that the ILECs could generate sufficient revenues to make up for the shortfall in access charge revenues under Bill-and-Keep.²¹ For perspective, the National Exchange Carrier Association (NECA) estimates that Bill-and-Keep would lead to a more than ten-fold decrease in revenues from access charges paid by Interexchange Carriers (IXCs) to small rural ILECs, and require an increase in end-user charges averaging approximately \$10 per month for those carriers.²² Therefore, the cost of transitioning to an inefficient pricing structure is hardly trivial.
26. Bill-and-Keep can also lead to inefficiency, as illustrated by my example in **Appendix A**, by providing incentives to PBX customers to shift their special access line traffic to the PSTN. Under the ICF Bill-and-Keep proposal, shifting from PBX to the PSTN could make sense as PBX customers would be shifting the cost of any additional required DS1 equipment to the ILEC, which would then recover the costs of that equipment from all of the customers on its network.
27. It is impossible to forecast with much certainty that the proposed Bill-and-Keep regime will lead to a shift of traffic back onto the public switched network without undertaking the kind of analysis performed by Brock in the 1980s.²³ Brock's analysis included consideration of the cost of alternative technologies and demand elasticities. It is striking that in the Commission's current

²¹ See, for example, Focal Communications Corporation, Pac-West Telecommunications, RCN Telecom Services, and US LEC Corporation Comments -- In the Matter of Developing a Unified Inter-carrier Compensation Regime, August 21, 2001 (CC Docket #01-92) -- Pages 6-7

If Bill-and-Keep were adopted, the Commission would need to establish new incumbent local exchange carrier (ILEC) federal end-user charges, and closely regulate them in order to assure they are reasonable. These end-user charges would include charges to recover ILEC costs that are currently recovered from interexchange carriers (IXCs) in interstate exchange access charges. States would not be responsible for assuring that ILECs charges to end-users to recover the costs of interstate exchange access are reasonable because these costs are jurisdictionally interstate. Even assuming states would choose to implement Bill-and-Keep for intrastate services, states will be unwilling to take responsibility for recovery of the costs of interstate exchange access by, for example, letting end-user recovery take the form of rate increases for local service. Therefore, under Bill-and-Keep the Commission would need to establish new federal end-user charges in order to permit ILECs to recover these costs and to assure that charges are reasonable

²² National Exchange Carrier Association Comments -- In the Matter of Developing a Unified Inter-carrier Compensation Regime, August 21, 2001 (CC Docket #01-92) -- Pages 5-6; see also National Telephone Cooperative Association Comments -- In the Matter of Developing a Unified Inter-carrier Compensation Regime, August 21, 2001 (CC Docket #01-92) -- Page 12

²³ Brock, see footnote 6.

undertaking there is no sign that it is undertaking the type of sensible economic analysis that was so important when it initiated access reform in the 1980s.

IV. Contrary To The Assertion's Made In The FNPRM, Digital Switching Has Become More Traffic-Sensitive Rather Than Less

28. The FNPRM notes that in the Commission's TELRIC NPRM²⁴ some parties suggested that a substantial majority of switching costs do not vary with minutes-of-use (MOU). For example, MCI argued that vendor contracts for switches establish per-line prices rather than per minute prices, and thus, according to MCI, LECs do not incur switching costs on a per minute basis.²⁵
29. Contrary to the assertions of MCI, the price structure of switch vendor contracts is far from determinative of the underlying costs of the switch.²⁶ For example, in recent UNE cost dockets ILECs have provided evidence showing that some switch vendor contracts charge for switches on a per line basis,²⁷ while others charge for switches based on the individual components ordered.²⁸ Furthermore, the contracts that specify a fixed cost per line do so in multiple rate bands based on the level of busy-hour centum call second (CCS)²⁹ throughput per line. As a result, it is clear that the level of expected usage, and not merely the number of lines connected to the switch, is driving costs.³⁰

²⁴ Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, WC Docket No. 03-173. (TELRIC Proceeding)

²⁵ FNPRM ¶23 at footnote 63; citing TELRIC Proceeding - Comments of MCI, filed December 16, 2003; at 30.

²⁶ MCI's suggestion aside, switch vendors have never charged LECs for switches on a per minute of use basis. However, switch vendors have utilized capacity cost pricing, something the Commission has previously endorsed. See, for example, the language cited at footnote 15.

²⁷ NMPRC Docket No. 3495 – Phase B, Recommended Decision of the Hearing Examiner, February 13, 2004; at page 93. With the single exception of clarifying a misinterpretation of Staff's position the Recommended Decision of the Hearing Examiner was "adopted, approved, and accepted" in its entirety by the New Mexico Public Regulation Commission. See: New Mexico Public Regulation Commission Docket No. 3495 – Phase B, Order On Recommended Decision, August 31, 2004; page 48.

²⁸ WUTC Docket No. 023003; Transcript, page 980, see also page 962.

²⁹ A unit of telecommunications traffic density that is the equivalent of one call (including call attempts and holding time) in a specific channel for 100 seconds in an hour. The 100 seconds need not be, and generally are not, in a contiguous block.
http://searchenterprisevoice.techtarget.com/sDefinition/0,,sid66_gci844795,00.html

³⁰ NMPRC Docket No. 3495 – Phase B; Direct Testimony of August H Ankum, at page 22; Qwest Brief at page 47, (footnote 173 174 citing Qwest Ex. 8 (Million Reb.) at 103-104; Qwest Ex. 13 (Craig Reb.) at 4, 6, 7); and Tr. Vol. 7 (Ankum Cross) at 139-42.

30. When presented with the MCI argument proffered above, the New Mexico Public Regulation Commission stated that:

While it appears that the terms of switching vendor contracts have been simplified so that switches are purchased on a per line basis, rather than by individual components, the record indicates that the nature of the underlying costs have not changed. For example, MCI agrees that a switch engineered to handle higher peak usage costs more than a switch designed to service a lower peak traffic volume. Given that switches are designed to accommodate certain levels of busy hour traffic, and this capacity is both finite and shared, it is appropriate to recover the cost of this usage-sensitive investment through a usage-sensitive rate structure;

[T]he retail rate structure chosen by the vendor does not necessarily reflect the true economic cost of providing the equipment in question. In this case, the vendor's retail rate structure simplifies the terms of the purchase by bundling together the costs of fixed and usage-sensitive components, but it does not alter the fact that Qwest is faced with usage-sensitive switching costs. Furthermore, if usage costs were truly irrelevant, or nonexistent as MCI claims, the per line prices of the switching contracts would not vary based on CCS throughput.³¹

31. Selling a switch on a per line basis is an example of bundling. Rather than just selling each component on an *a la carte* basis, the manufacturers offer their clients the choice of buying equipment on a bundle or *a la carte* basis. Theoretically, it is well known that the price of a bundle is not independent of the cost of manufacturing the equipment, rather, the price of the bundle increases as the cost of production increases.³² This explains why the bundle price for circuit switching varies as a function of usage because the cost of production increases as the level of busy-hour traffic increases. For both packet and circuit switching, the amount of equipment installed in an office is a function of the busy-hour traffic load. Consequently, when a manufacturer establishes the bundled price for switching, it must either take into account the level of busy-hour traffic or forgo profits. If the Commission concludes that the price of switching is set independent of the level of busy-hour traffic, it is either rejecting the well-developed theory of pricing bundles or concluding that despite

³¹ New Mexico Docket No. 3495 – Phase B RD at page 93.

³² See, for example, Lynne Pepall, Daniel J. Richards, and George Norman, Industrial Organization: Contemporary Theory and Practice ((1999), pp. 191-201.

this well-developed theory, manufacturers of switching machines do not set their prices to maximize their profits.

32. Moreover, the retail rate structure of a carrier is not determinative of underlying costs. For example, in the retail long distance market, carriers offer “all you can consume” buckets of minutes as well as metered service. These carriers essentially tell consumers that they can have unlimited local and long distance calls for approximately \$50 per month,³³ while metering long distance usage for everyone else. The fixed rate for unlimited usage does not suggest that the incremental cost of carrying traffic on the network is zero; rather, it is just an example of mixed bundling where the vendor provides customers the option of either buying services *à la carte*, or as a bundle. Carriers offer such bundles for various reasons -- such as the likely reduction in churn -- not because the provider’s cost structure is non-traffic-sensitive.
33. I have observed a similar phenomenon in the cellular telephone market. From its inception, cellular service was offered almost exclusively on a per minute basis (as was the case with wireline services), but here too there has been a migration towards mixed bundling.³⁴ Some customers prefer the bundle because it provides greater predictability regarding monthly charges; other customers prefer to pay for only what they actually use. Carriers like the bundled approach because, in instances where there are unused minutes, it entices customers to pay for more capacity than actually needed. However, the existence of bundling schemes does not mean that a cellular network is entirely non-traffic-sensitive.³⁵ Rather, it is merely a retail-pricing scheme offered by the provider to maximize profit.
34. The FNPRM also suggests “that switching costs are primarily a function of the number of subscribers, rather than the number of calls or MOU, because a reduction in call minutes per subscriber would not substantially reduce the investment and operating cost of the switch serving those customers, at least in the case of wireline networks.”³⁶ Elsewhere, the FNPRM suggests that switch costs are independent of usage because, as argued by AT&T, “switches generally have excess capacity so that increases in usage do not increase the cost of a switch.”³⁷ It is also suggested that carriers pay for equipment on a flat

³³ MCI’s unlimited calling plan starts at \$49.99 per month. See: http://consumer.mci.com/compare_plans.jsp#LDPlans; AT&T’s unlimited calling plan starts at \$48.95 per month. See: <http://www.shop.att.com/plancomparison/>.

³⁴ Although bundled ‘buckets’ of minutes are now the predominant rate structure, cellular carriers continue to offer per minute of use calling plans as well.

³⁵ Bridger M. Mitchell and Padmanabhan Srinagesh, Transport and Termination Costs in PCS Networks: An Economic Analysis, April 4 2000, CC Docket Nos. 95-185, 96-98, and 97-207.

³⁶ FNPRM page 103 at note 40.

³⁷ FNPRM ¶23 at note 64.

basis; that is, they do not make ongoing payments to the switch vendor that depend on how much the switch is used.³⁸

35. These statements (and others that allegedly support the argument that switching costs are subscriber, rather than usage, driven) were recently addressed by some state regulatory commissions. When faced with similar arguments, state commissions have found that the conclusion that switch costs are independent of usage is unsupported. For example, the New Mexico Commission found that:

Switching costs only appear to be fixed because Qwest does not pay its vendors on an ongoing basis. Qwest does not pay its vendors on an ongoing basis because Qwest pays for more than enough capacity up front, all at once. The timing of the investment, however, does not affect the cause of the cost. Because usage is constrained by capacity that is both finite and shared, usage is a cost driver, regardless of when it is paid for or if it is bundled with other parts of the switch.³⁹

36. Similarly, the Washington Commission stated that:

...we are not persuaded that because Verizon makes no additional payments to the vendor once the switch is installed, a flat usage rate is required. With most investments, once the facilities are installed, no additional payments are made to the vendors. For example, once an interoffice fiber cable is buried in the ground, no additional payments are made to Verizon's cable vendor. This doesn't negate the fact that interoffice traffic was the activity that caused Verizon to build the facility. The timing of the payments does not affect the cause of the costs.⁴⁰

37. The fact that modern switches often have excess processing capacity does not force the conclusion that capacity costs are NTS. Such a conclusion utterly fails to recognize the reasons why modern switches have been engineered with so much capacity in the first place. One such reason,⁴¹ for example, is a remnant of the fact that as the Internet boom began in the early 1990s, it was

³⁸ FNPRM ¶23; see also WUTC Docket No. 023003 – 24th Supplemental Order ¶508.

³⁹ New Mexico Public Regulation Commission Docket No. 3495 – Phase B, Order On Recommended Decision, August 31, 2004; pages 12-13.

⁴⁰ WUTC Docket No. 023003 – 24th Supplemental Order ¶517.

⁴¹ I elaborate on another reason for the growth in switch processor capacity below, in the next section of this affidavit.

fueled almost exclusively by dial up Internet connections. The sudden and pervasive increase in traffic bound for the Internet often caused congestion and blocking at the switch that required additional processing capacity to handle the increase in calling and/or longer hold times.⁴² The fact that dialup Internet access no longer causes the congestion problems it once did, due to the availability of non-switched broadband connections, does not detract from the fact that the dial up Internet connection usage anomaly of the 1990s stressed the existing switching network capacity to the point where it was impossible to ignore the traffic-sensitive nature of switch investments.

38. Furthermore, the Staff study of Bill-and-Keep attached to the FNPRM suggests a fundamental misunderstanding of the issue at hand. Staff writes: "... switching costs are primarily a function of the number of subscribers, rather than the number of calls or MOU, because a reduction in call minutes per subscriber would not substantially reduce the investment and operating cost of the switch serving those customers, at least in the case of wireline networks."⁴³ The objective of this proceeding is not to determine what the traffic sensitive costs are if one subscriber reduces their calling. The right question to ask is what incremental costs are imposed on a carrier when another carrier needs to terminate additional interoffice traffic on the terminating carrier's network?⁴⁴ In other words, the issue at hand involves wholesale, rather than retail, usage of the network.
39. Moreover, loop facilities are evolving so that an increasing percentage of customers are connected to the switch via digital line carrier (DLC)⁴⁵ using the GR-303 protocol. A primary advantage of the GR-303 interface is that it supports a flexible concentration ratio. Concentration is a technique enabling some number of telephone users to employ a smaller number of trunk paths to the switch by utilizing the principle that not everybody uses his or her telephone at the same time. By concentrating traffic at the next generation DLC (NGDLC)

⁴² The Internet boom also caused a surge in line counts as users ordered additional lines so that dial up Internet access would not result in missed calls.

⁴³ FNPRM, Appendix C page 103 at note 40.

⁴⁴ 47 U.S.C. §252(d)(2)(A)

⁴⁵ Indeed, in forward-looking cost studies, some ILECs contend that only DLC loops should be modeled because it is the only type of feeder capacity being installed today.

"Verizon's cost studies assume deployment of 100% fiber cable in the network. Verizon supports this proposal by stating 'the economic efficiency of optical DLC has reached a point where all feeder capacity can be most efficiently created using these systems. For several years, all new feeder capacity for Verizon ME has been added with optical DLC.' (internal citation omitted) Maine Public Utilities Commission Docket No. 97-505; Hearing Examiners' Report, January 18, 2002, page 51-52.

equipment, port requirements are reduced, greatly improving the utilization, and hence the economics, of expensive Class 5 switching ports.⁴⁶

40. This is significant because switch vendors price GR-303 facilities on a per DS-1 basis. The number of DS-1s ultimately required is a function of busy hour traffic generated at the remote terminal, not the number of end user lines connected to the remote terminal.⁴⁷ Thus, contrary to the suggestions of AT&T and MCI cited in Appendix C to the FNPRM,⁴⁸ it is clear that busy hour traffic, not the number of subscriber lines, is increasingly driving network costs.

A. Switching Costs Are Traffic-Sensitive

41. Another reason the Commission supports Bill-and-Keep is its apparent determination that switching costs are non-traffic-sensitive. The Commission cites to the Wireline Competition Bureau's decision in the Verizon Arbitration case as the basis for this conclusion.⁴⁹ In the Virginian Arbitration case the Wireline Bureau drew the inference that if switching manufacturers sell circuit switches at a fixed cost per line, it then follows that the switch is non-traffic-sensitive. As previously discussed, this reasoning is fallacious because the per-line rate is merely a bundled price that lumps together the cost of the line and trunk terminations, as well as the getting-started cost of a switching machine. Furthermore, the cost of producing the circuit switch bundle varies with the level of busy-hour traffic. In this portion of the affidavit, I show why the cost of producing and the price of a switch is a function of the level of busy-hour traffic. I also show that the percent of the price of the machine that is traffic-sensitive is increasing over time because of the expanding use of digital line carrier systems.
42. In support of my view I have constructed a spreadsheet that reflects the engineering practices used for sizing a Northern Telecom DMS-100. This is one of the two most common circuit-switching machines used in the United States. The other commonly used circuit-switching machine, the #5ESS, is

⁴⁶ For example, consider a residential application consisting of 668 POTS lines with a per-line traffic requirement of 6 CCS and a blocking probability of 0.01. Without loop concentration, this application would require 28 DS-1 facilities and 28 DS-1 ports. Using loop concentration, remote terminals accepting up to 668 subscriber lines can be supported with only six DS-1 facilities (approximately an 80% facility reduction), while ensuring the same grade of service as the non-concentrated scenario. See: ESMA—TR-303 Interface Providing Enhanced Capacity, Services, and Cost-Efficiency, Nortel Networks Planning Document for the Expanded SCM-100A digital interface, April 1996, at 21.

⁴⁷ New Mexico Public Regulation Commission Docket No. 3495 – Phase B, Qwest Corporation's Responses to Bench Requests filed on December 30, 2002.

⁴⁸ See FNPRM page 103, note 40.

⁴⁹ FNPRM ¶¶67-68; and page 102 citing Virginia Arbitration Order ¶¶463-483.

typically characterized by a **higher** percentage of traffic-sensitive costs, which makes the DMS-100 findings conservative.

43. A DMS-100 switching machine is primarily composed of the trunking, line, network plane, and getting-started investments. Some lines enter the central office on copper and pass through the main distribution frame on their way to the switch. At the switch, the DS0 level connection is terminated on a line card. The line card rests in a line module, which in turn, is held by a line frame. This frame is connected to a line group controller. The line group controller concentrates traffic at different ratios depending on the level of busy-hour traffic per line. The line group controller, in turn, is connected to the network plane (often an E-NET). The network plane is used for connecting trunk-to-line or line-to-line connections.
44. If the line enters the office on a digital line carrier system, the termination on the switch is typically done at the DS-1 level. The DS-1 terminations use different cards than the DS0 connections, as well as different terminating modules.
45. The number of DS0 to DS1 links at the carrier serving area interface should be determined based on the coincident busy-hour traffic on a SONET ring.⁵⁰ Sometime engineers do not use a traffic table, like the Erlang-B, to determine the number of DS1 terminations. Rather they use a rule-of-thumb that is a function of busy-hour usage to be carried by the NGDLC (next generation digital loop carrier).⁵¹ The higher the level of busy-hour traffic, the lower the concentration ratio.

⁵⁰ Direct Testimony of W. Keith Milner, BellSouth Telecommunications, Inc. Before the Alabama Public Service Commission, Docket No. 27821, November 8, 2000, at 6. GR-303 supports flexible concentration ratios from 1:1 (672 lines served by 28 DS1s) up to 46:1 (2,048 lines served by 2 DS1s). (The Evolution of Digital Loop Carriers, Occam Networks Whitepaper, May 2001, <http://www.occamnetworks.com/pdf/DLCEvolution3-01.pdf>, at 4.)

⁵¹ For example in a proceeding before the New York Public Service Commission, WorldCom advocated that a 6:1 concentration ratio be used between the switch and digital line carrier. On the other hand, Verizon advocated "a 3:1 concentration ratio, which it says represents the judgment and experience of its network engineers on the best way to balance the countervailing interests in minimizing port costs per loop through a higher concentration ratio and avoiding the call blocking that would result if a free switch port were unavailable when needed because the ratio was too high." See: New York Public Service Commission Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements, CASE 98-C-1357, January 28, 2002, Page 91.

Concentration is a common practice among RBOCs. Verizon California in 1993 stated that "Verizon CA plans a 4:1 concentration ratio for all DLC systems for voice grade loops, regardless of DLC type". Verizon Response by Bill McClure (Manager -- Network Engineering and Planning -- California Region) to Joint Commentors Data Request No. 51, Rulemaking on the Commission's Own Motion to Govern Open Access to Bottleneck Services and Establish a Framework for Network Architecture Development of Dominant Carrier Networks, Rulemaking 93-04-003, April 7, 1993.

46. The flow-of-traffic on the switch is controlled primarily by the central processor of the switching machine. The central processor communicates with the line and trunk modules to determine how different functions will be completed (e.g., provide dial-tone, caller identification information, network path information, system monitoring, etc.). The central processor is a primary component of the getting-started cost of a switching machine.
47. The DMS-100 spreadsheet was designed to reflect the engineering practices of Northern Telecom. The type of equipment installed in an office is largely a function of the number of lines, busy-hour CCS, percent inter-office traffic, and DLC terminations. The spreadsheet that I developed for this proceeding uses this demand and network information to determine the type of equipment that would be installed in a number of model offices.
48. The total investment for the different model offices is segregated into cost categories: line, traffic-sensitive and shared investment. First, there is the equipment that is used to terminate the DS0 loops, the line cards, line drawers, line modules, and line frames. The traffic-sensitive equipment is used to terminate interoffice facilities and GR303 digital line carrier systems.⁵² The shared investment is composed of the network plane and the getting-started investment.
49. Line-related investment should be classified as NTS and the traffic-sensitive investment as TS investment. The shared E-NET plane is used for connecting lines and trunks during calls and therefore it is appropriately classified as traffic-sensitive investment. The primary investment in the shared getting-started costs is the central processor and the network plane. The central processor is designed to have sufficient capacity so that it can handle peak levels of demand for calls and vertical features and its costs is marginally related to monitoring if lines are operating properly. Therefore, the Commission should consider the shared investment to be predominantly traffic-sensitive investment.

⁵² Regulatory agencies in both Germany and the United Kingdom have found DLCs, by virtue of their concentrating functions, to be traffic-sensitive portions of the network and regulate them accordingly. For example, in Germany, the Regulatory Authority for Telecommunications and Posts (RegTP), has found that: "[b]y virtue of their concentrator function the digital line units are, from the subscriber's point of view, the first traffic-sensitive equipment of the telephone network." (An Analytical Cost Model for the Local Network, A Consultative Document prepared by Wissenschaftliches Institut für Kommunikationsdienste, GmbH (WIK) for the Regulatory Authority for Telecommunications and Posts, March 4, 1998, at §2.3.3. A digital line unit is functionally equivalent to a DLC.)

The Australia Competition and Consumer Commission (ACCC) similarly treats the concentrator as part of the of the switching/transmission network, not as part of the access network. As does the Office of Telecommunications (OFTEL) in the United Kingdom.(See Pricing of Unconditioned Local Loop Services (ULLS) and Review of Telstra's proposed ULLS Charges, Australian Consumer and Competition Commission, August 2000, at 5. and Long Run Incremental Costs: The Bottom-Up Network Model, OFTEL, March 1997, Version 2.2, at 2-13 Where the weighted average cost for the concentrators is computed using the proportion of busy hour traffic through the concentrators.)

The spreadsheet has been used to identify how the movement to DLC affects the percentage of the switch that is traffic-sensitive. The line-weighted results from the scenarios modeled are summarized in

50. Table 1 below:

Table 1: Traffic-Sensitive Share of Circuit Switch as Function of DLC Usage

PERCENT DLC	PERCENT Shared	PERCENT LINE	PERCENT CCS
0	21%	57%	22%
40	23%	37%	40%
70	28%	23%	48%
100	38%	0%	62%

51. The shared investment percentage is positively correlated with the percentage of DLC because of the investment savings associated with using DLC. The employment of DLC reduces the total investment in the switch, and consequently the shared investment is a larger percentage of the total.

52. Table 1 demonstrates that digital switching machines are not essentially NTS. Like their packet switching counterparts, the investment in a digital switching machine is significantly impacted by the capacity dedicated for terminating interoffice and DLC trunks. It is a simple matter to identify the directly attributable traffic-sensitive costs that are a function of the number of DS1 terminations. Secondly, the results from this model suggest it would be appropriate to set a different price for interconnection than switching. What I have identified as shared costs should be recovered through the UNE switching rate, but excluded from the calculation of the direct incremental cost of interconnection.

Another facet of

53. Table 1 that is interesting is how these values conform to estimates previously provided to the Commission. At 0% DLC the model I developed estimates the NTS portion of digital switching costs to be 57%, which is very close to the USTA estimate of 51% provided to the Commission in 1997.⁵³ To put this into perspective, in 1997 essentially no ILECs were using NGDLC to provide DSL.⁵⁴

⁵³ First Report and Order, FCC 97-158, Released: May 16, 1997 at ¶131

⁵⁴ DSL Anywhere: A Paper Designed To Provide Options For Service Providers To Extend The Reach Of DSL Into Previously Un-Served Areas, a DSL Forum Whitepaper submitted December 12, 2001 in

Now that DSL service utilizing NGDLCs has become the standard for the industry, it stands to reason that the percentage of digital switching costs that are NTS would decrease dramatically, as the model I developed shows it has.

54. The previous discussion demonstrated the fallacy of the presumption that digital switches are non-traffic-sensitive. In the section to follow I present empirical data, demonstrating that a next-generation IP-based network consisting of packet switches, soft switches, and routers will, if anything, be more sensitive to capacity issues than the current PSTN. This is because the flexibility of an IP-based network will enable network managers to push intelligent capacity management functionality into equipment located deeper in the network and farther out towards the network edge.
55. As a means of framing the coming discussion, and to put some of what has been said previously into context, a brief digression on the meaning of capacity management and its bearing on the recovery of traffic-sensitive costs is in order. What I believe is the most sensible course for the Commission to pursue is to recognize the inherent capacity-sensitive nature of significant portions of the country's current, and future communications network(s). This recognition would not necessitate a continuation of per minute of use charges beyond some transitional time period, or the creation of per packet charges (which have been deemed to be very difficult and non-cost effective to implement). What it does require, however, is the establishment of flat-rate monthly recurring charges assessed on the basis of network interconnection capacity purchased by interconnecting carriers, rather than a bill-and-keep regime. As far as recovery from end-users is concerned, the carriers would continue to have the latitude to recover their capacity-related costs in a manner that is compatible with the market and their financial goals. I would expect this to mean a continuation of the current retail market pricing structure that provides customers the option of capacity or usage charges (mixed bundling).⁵⁵

the National Telecommunications and Information Docket No. 011109273-1273-01, In the Matter of Request for Comments on the Deployment of Broadband Networks and Advanced Telecommunications, available at http://www.ntia.doc.gov/ntiahome/broadband/comments/dslf/dsl_anywhere.pdf, at 6.

Concerning the contention that most DLCs currently in the network must be upgraded to provide DSL see also, Local Loop 101: Technical Brief, OCCAM Networks, May 2001, available at http://www.occamnetworks.com/pdf/Local_loop.pdf; and Extending Asymmetric Digital Subscriber Line (ADSL) Services to Remote Digital Loop Carrier (DLC) Locations, The International Engineering Consortium, Web ProForum Tutorials, <http://www.iec.org>, at 1.

⁵⁵ For example, a POTS user has the choice of paying a fixed fee for unlimited use of the local network or a measured rate service. The same options are provided by the interexchange carriers to their subscribers of long-distance service.

56. What does not make economic sense is the proposed imposition of a one-size-fits-all increased retail subscriber line charge that completely divorces the retail price from cost causation.

B. ‘Getting-Started’ Costs Are Not Synonymous With Line Related Costs

57. In the Virginia Arbitration Order⁵⁶ the Commission’s Wireline Competition Bureau (WCB) defined the “getting-started” cost of the switch, also known as the “first cost,” as the costs of the central processor, memory, maintenance, administrative, test, and spare equipment, and other common equipment.⁵⁷ The WCB went on to determine:

...that the “getting started” cost of the switch is a fixed cost, meaning that it does not vary with the number of ports or the level of usage on the switch... Principles of cost causation, therefore, support a per line port cost recovery approach because, more than any other approach, it spreads getting started costs to carriers in a manner that treats equally all subscribers served by a switch.⁵⁸

58. However, evidence suggests that the getting-started costs of the switch, which is primarily driven by the capabilities and, as noted above, the calling capacity of the central processor, is highly correlated to the calling services offered by the LEC and usage, but not the number of lines the LEC serves.
59. For example, the initial central processors used in DMS-100 switches were not capable of adequately providing digital centrex and other non-basic exchange services.⁵⁹ Consequently, Northern Telecom had to re-engineer the central processors of the switch. ILECs had to purchase new central processors that had sufficient processing power for digital centrex and other vertical services. When these upgrades were made in the early 1990s, NYNEX informed the Commission that it expected a continued need to upgrade the processor of the switching machines so that it could expand the provision of custom call services.⁶⁰

⁵⁶ Virginia Arbitration Order

⁵⁷ Virginia Arbitration Order at footnote 988.

⁵⁸ Virginia Arbitration Order ¶463.

⁵⁹ Communications Week, January 13, 1986, p.1, 38.

⁶⁰ NET 1993 Depreciation Rate Study, p.8.

60. The changes were not limited to Northern Telecom switches. Explaining the need to increase the depreciation rate for the #5ESS switching machine and remotes, NYNEX pointed out that "as the switches upgrade to the higher levels of more complicated software generic programs that offer CLASS, AIN (advanced intelligent network), ACD capabilities, major change-outs are occurring within the switch. The software upgrades not only provide CLASS, AIN, etc. capacity, but are mandatory requirements for 800 Numbers Portability, CIC Code Expansion and National ISDN-1."⁶¹
61. Thus, the decision by the WCB to recover all "getting-started" costs on a flat per port basis is improper because it fails to efficiently apportion costs among all users that share the facility. Under the WCB decision, all parties connected to the switch pay for investments in non-POTS features like Caller ID, etc. even if they do not actually order such services. The approach chosen by the WCB is also contrary to the Commission's previous determination in the New Hampshire and Delaware 271 Application⁶² where the Commission concluded:

...that the New Hampshire Commission's allocation of the "getting started" costs to the MOU element was not unreasonable when considered in conjunction with other allocations it made to the fixed rate element.⁶³

62. When confronted with this issue, the New Mexico Commission stated that it:

...disagrees with the Bureau's conclusion that, regarding getting started costs, charging a per line port price recovers costs from CLECs on a competitively neutral basis, whereas charging a per MOU price would not. The Bureau found that cost causation principles do not support a per MOU price because it would recover proportionately more of the getting started costs from high usage subscribers than from low usage subscribers.⁶⁴ This Commission believes that, to the contrary, traditional cost causation principles do support a per MOU price because high volume users cause more switching costs than low volume users,

⁶¹ NET 1993 Depreciation Rate Study, p.8.

⁶² *Application by Verizon New England Inc., Verizon Delaware Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Co. (d/b/a Verizon Enterprise Solutions), Verizon Global Networks Inc., and Verizon Select Services Inc. for Authorization to Provide In-Region, InterLATA Services in New Hampshire and Delaware*, Memorandum Opinion and Order, WC Docket No. 02-157 (released Sept. 25, 2002). (NH and DE 271 Application)

⁶³ NH and DE 271 Application ¶¶61.

⁶⁴ Virginia Arbitration Order, ¶ 465.

so they should pay proportionally more for the greater capacity consumed.

Finally, this Commission disagrees with the Bureau's reasoning in support of its adoption of a flat per port price rather than a usage based price for shared peak-period costs. The Bureau states that a per MOU price would fail to signal to CLECs that these costs vary with usage during the peak period. However, the Bureau fails to explain how a flat per port price will carry this signal. Additionally, the Bureau's ruling does not fix the problem of over-utilization during peak periods. The Bureau implies that if the MOU rate structure is not 100% effective, it should not be used at all. This Commission does not agree.⁶⁵

63. The Washington Commission reached a similar conclusion:

In this proceeding, AT&T and Staff have instead proposed a flat-rate charge to recover customer-related usage-sensitive costs. The same charge would apply regardless of whether the CLEC customers were low- or high-usage subscribers. This proposed rate structure fails to meet the objective of aligning rates with costs. We believe that the correlation is higher between peak cost responsibility and a per minute rate, than between a flat-rate charge and usage-sensitive costs, where the bill to the user is independent of usage. By definition, if the usage charge to all customers is the same, the correlation between responsibility for peak costs and charges is zero. But with a per-MOU rate, intensive users of the network will pay more, and the payments will be better correlated, in a wholesale environment, with responsibility for peak usage costs than a flat-rated charge.⁶⁶

C. Packet Switching In The Next-Generation Network Is Capacity Constrained As Well—Perhaps More So Than in the Traditional PSTN

64. In the FNPRM, the Commission asks: "To what extent do any capacity constraints become obsolete as carriers migrate to Internet-protocol switching?"⁶⁷ I believe that as we progress towards more tightly integrated and

⁶⁵ New Mexico Public Regulation Commission Docket No. 3495 – Phase B, Order On Recommended Decision, August 31, 2004; pages 13-14.

⁶⁶ WUTC Docket No. 023003 – 24th Supplemental Order ¶516.

⁶⁷ In the Matter of Developing a Unified Intercarrier Compensation Regime, CC Docket No. 01-92, *Further Notice Of Proposed Rulemaking*, Released: March 3, 2005 at ¶68.

converged networks, the issue of capacity constraints will become more important rather than becoming obsolete. My belief is supported by the demands on the network in terms of the dynamic and efficient allocation of capacity (bandwidth) among multiple users and sites with diverse service demands in terms of quality of service and products utilized.

65. The challenge facing the converged network is the ability to meet the varied needs of a wide range of disparate uses in a cost-effective manner. For example, real-time services, such as video-conferencing, have stringent requirements in terms of delay, jitter, and packet-loss, while activities such as web-browsing can easily be met through best-effort protocols. One approach to this challenge would be to over-dimension the network by engineering it to meet the performance requirements of the most fault intolerant applications and services. This is not economically efficient. Instead, this challenge is typically met by deploying appropriate quality of service (QoS) mechanisms within the network that assign the highest performance protocols to be delivered only to that fraction of traffic which requires this treatment.⁶⁸
66. The other, and concurrent, approach that is being taken to meet the challenges of delivering multiple services over the converged Next Generation Network (NGN) is to push the network intelligence farther out towards the network edge.⁶⁹ This distributed intelligence will permit greater flexibility in providing the appropriate signaling and control functions for the various types of units, and associated interfaces, accessing the network.⁷⁰ From a service delivery standpoint, distributed network intelligence makes eminent sense. For example, currently the most significant driver of change in the broadband network is video, in all its various formats, along with other multimedia applications. In order to support this variety of applications, along with their evolution, it would be more efficient to distribute the media processing and control on a service basis among various network elements along the network edge where they would be closer to the end users.⁷¹

⁶⁸ S F Carter, N W Macfadyen, G A R Martin, R L Southgate, "Techniques for the Study of QoS in IP Networks" in Telecommunications Performance Engineering, ed. Roger Ackerley, Institution of Electrical Engineers © 2004 at p161.

⁶⁹ See, for example, *Next Generation Networks, A Briefing Note*, Office of the Director of Telecommunications Regulation, Ireland, November 16, 2001 at p.18. Available at <http://www.odtr.ie/docs/odtr0188.doc>. And Timothy Horan, CFA, Steve Kamman, and Jennifer M. Firlings *Smart Packet Networks—Battle For The Soul Of A New Network*, CIBC World Markets, October 16, 2000 at p. 9.

⁷⁰ The Next Generation Network Call Agents, Softswitches And Network Intelligence – The Open Services Environment Of Tomorrow, Issue Brief #8 – Jan. 2001, page 2. Available at <http://www.usda.gov/rus/telecom/rtb/rtb-study/telcordia-ngn-study-6-c.pdf>.

⁷¹ Ken Meaghe, *A Triple Play Top 10 Service Provider Considerations For Platform Selection*, February 2005, available at <http://www.tmcnet.com/voip/0205/special-focus-Triple-Play.htm>. Efficiency is gained from this configuration because more function control in edge equipment permits greater ease in the

67. Having network intelligence more widely distributed also permits more dynamic management of bandwidth routing between different devices (routers, core switches, etc.) in the network, and capacity allocation among different applications and classes of users. For example, "...depending on the way a subscriber logs on to the network, the service provider can determine what services are available for that specific session. This dependency can be hardware related (Ethernet, WiFi, etc.) or it can be business driven, based on the provider's rules. Moreover, providers will need to prioritize a user's session based on characteristics of the respective application such as VoIP or VoD where jitter cannot be tolerated."⁷²
68. Furthermore, NGN devices are now typically capable of providing flexible dynamic bandwidth on demand (BoD) to end-users. For example, a user with low bandwidth subscription contract for e-mail service and Web browsing has the ability to access a Web portal to dynamically change their bandwidth for an additional fee or time period should they feel the need.⁷³
69. The cumulative effect of all these uses of the next generation packet switching network will result in ever increasing capacity demands on that network. As a result, the net generation packet switching network is likely to be more capacity-sensitive, and capacity-constrained, than the traditional PSTN. This fact alone makes adoption of Bill-and-Keep pricing for intercarrier transactions an irrational choice.

D. An Example Of A Next Generation Network

70. KT's (formerly Korean Telecom) proposed build-up of its broadband network provides an illustration of what one Next-Generation network looks like. KT's proposed network, as shown in Figure 1 and

individual assignment of access authorizations, bandwidth allocations, and security filters for each customer address. Thus the backbone network is freed from the processing of user assignments in real time and so is able to switch and transport packets at full speed based on header information independent of the specific users that make up the traffic. Efficiency is also gained because more intelligent edge devices permit the caching of frequently accessed Web content, including streaming-media closer to the end-user. This frees up the backbone from carrying duplicated same page traffic. ("Controlling Your Network - A Must for Cable Operators", Cisco 1999 White Paper, available at <http://www.cptech.org/ecom/openaccess/cisco1.html>, page 5)

⁷² The Service Exchange Framework: Providing Greater Control For Cisco IP Next-Generation Networks, Cisco Systems White Paper (2005) at p. 5.

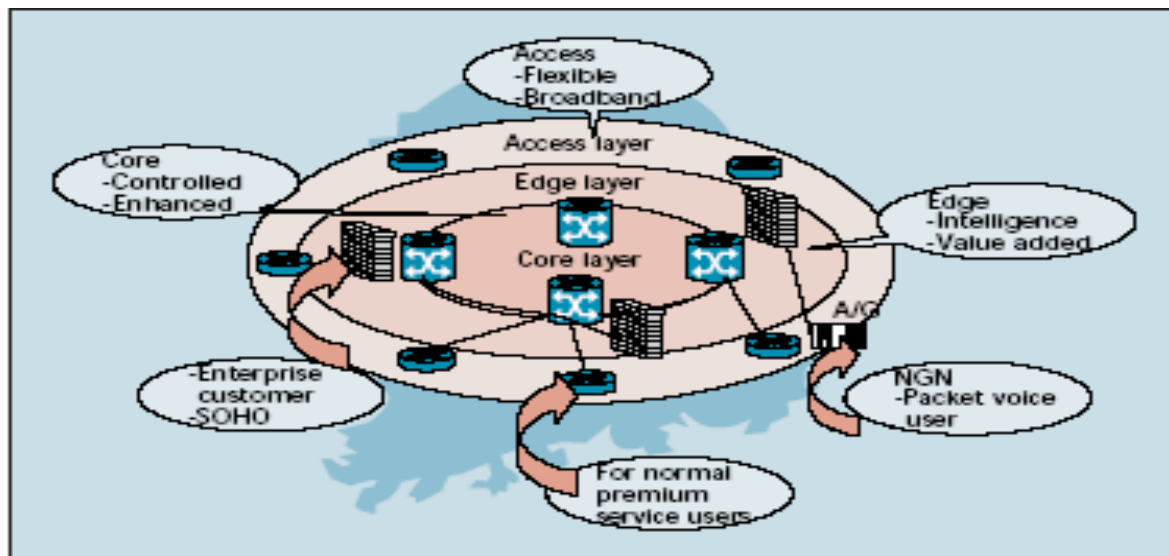
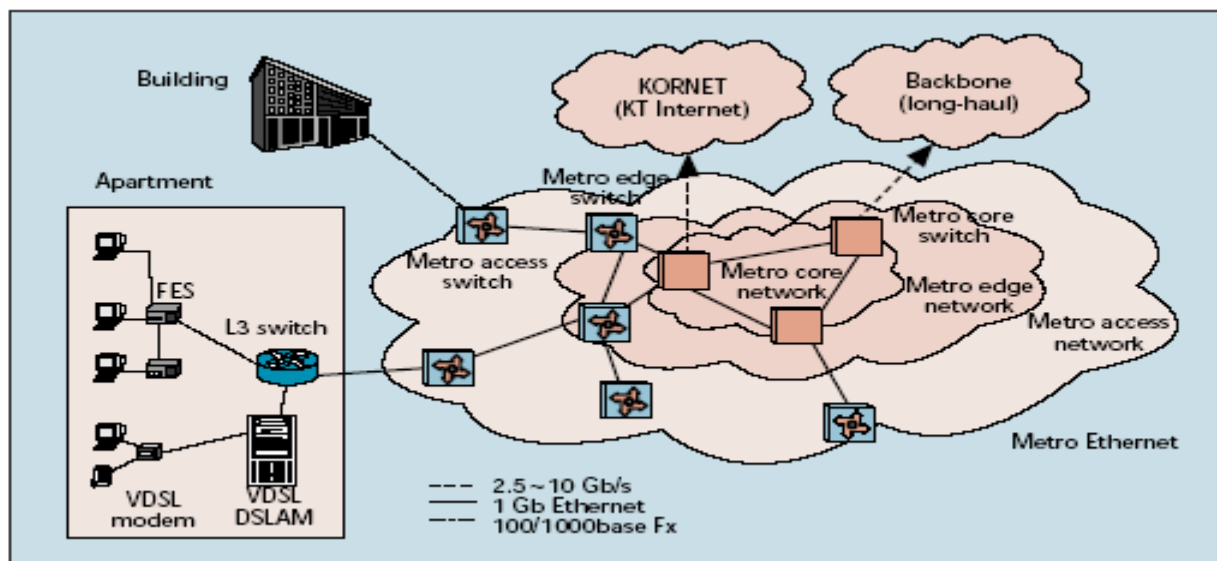
⁷³ *Id.*

71. Figure 2, consists of three parts: access, edge⁷⁴, and core networks. Interaction between a customer's equipment and network edge nodes is the responsibility of the access network, which is shared between managed service traffic and best effort traffic. This necessitates differentiated traffic handling at the access network level, which ranges from simple priority handling to sophisticated traffic management techniques such as virtual tunnels supporting quality-of-service (QoS) and security. The core network will consist of a set of Multiprotocol Label Switching (MPLS) tunnels providing high-throughput transport of packets between edge nodes.⁷⁵
72. Service intelligence is contained in the edge network where QoS requirements are mapped between it and the core network, with different route control for best effort and managed service traffic. This requires each incoming packet from the access network to be mapped to the proper MPLS tunnel in the core network and vice versa. Furthermore, each packet must be processed so as to identify source address, application type, destination address, and other information required to perform proper routing and traffic management functions. The edge also contains those value-added features (content filtering, caching, etc.) that are best provided at edge locations.⁷⁶

⁷⁴ The Inter-carrier Compensation Forum (ICF) includes in its proposal in this docket a provision to restructure the "edges" between networks. This discussion of KT's edges does not support the ICF's proposal.

⁷⁵ Yong-Kyung Lee and Dongmyun Lee (KT—formerly Korea Telecom), "Broadband Access in Korea: Experience and Future Perspective," IEEE Communications Magazine, December 2003 at 35-36.

⁷⁶ *Id.*

Figure 1: Conceptual View of a Premium Network for Next-Generation Services⁷⁷Figure 2: More Detailed Look at KT Enhanced Network⁷⁸⁷⁷ *Id.*⁷⁸ *Id.* at 32.

73. As should be evident from this brief discussion, it does not appear that the migration to Internet-protocol switching will result in the disappearance of capacity management and constraint issues anytime in the near future. If anything, the distribution of intelligence deeper into the network will result in more dynamic and granular bandwidth management and routing than what has formerly been possible in the circuit networks. Thus, moving to a packet switched network, arguably, results in an increase in traffic-sensitive switching components. Moreover, to address head on the example provided by the Commission in support of its supposition that capacity constraints become obsolete with a move to packet switching,⁷⁹ I would like to point out that Cisco Systems itself has stated:

The growing number of broadband Internet subscribers and the emergence of broadband-aware applications using much bandwidth, such as P2P file sharing, voice, or streaming media is having an impact on the cost and profit equation for service providers. Regardless of the amount of bandwidth operators make available, new applications and growing file sizes make network congestion inevitable.⁸⁰

E. Empirical Evidence That NG Switching Costs Are Traffic-Sensitive

74. I now turn to a presentation of empirical evidence, developed by Marvin Sirbu, *et al.*, concerning the impact of changes in data and voice rates on the switching components of a broadband wireline access network with a PSTN infrastructure that has been completely replaced by an IP network that is extended to the home using ADSL technology. This is then compared to the effects of changes of the same nature on the switching elements of a broadband wireline access network having a cable-based architecture.⁸¹
75. Results for the PSTN-like ADSL network show that when the default data rates (20K/2K for households and 80K/20K for small businesses⁸²) are multiplied by

⁷⁹ At footnote #236 of FNPRM, FCC 05-33, the Commission pointed out that "Cisco Systems, Inc. has introduced a new router with so much capacity that it can transfer the entire collection of the U.S. Library of Congress in 4.6 seconds".

⁸⁰ The Service Exchange Framework: Providing Greater Control For Cisco IP Next-Generation Networks, Cisco Systems White Paper (2005) at p. 9.

⁸¹ The study from which this presentation is derived is: Daniel Fryxell, Steven Lanning, and Marvin Sirbu, "Broadband Access Networks and the Emergence of Voice over IP (VoIP): an Economic Analysis for Cable and ADSL," (1999) Available at www.ini.cmu.edu/ITC/TPRCpaper_final.pdf.

⁸² The authors of this study state that these data rates were derived, in part, from research done at AT&T Laboratories which found that a typical household "...broadband Internet surfer looking at text and still pictures can read data at only 40 Kbps, averaged over a 3-minute interval, and needs an

factors of 0.5, 1, 2, and 5, the annual capital cost per location for access servers, routers and SONET equipment increases by an average of 53% -- going from a multiple of 0.5 to 5 -- despite the fact that the total cost of the network increases by little more than 2%. In the cable network, where access is shared and thus more sensitive to variations in bandwidth usage, total network cost increased by 14%, nodes increased by 32% and the total cost of Cable Modem Termination Systems (CMTSs), routers and SONET equipment increased by an average of 176%.⁸³ These findings clearly show that PSTN-like ADSL networks and broadband cable networks both have switching elements that are usage-sensitive. What is more, these results appear to imply that in networks where access is shared (arguably the situation that will apply in a converged packet network), network switching elements are even more sensitive to usage.

76. Concerning voice modeled using a variety of voice codec data rates,⁸⁴ the Sirbu analysis found that total cost for the ADSL system "...increases less than 1% from the least bandwidth intensive to the most bandwidth intensive codec. The cost of access servers, routers and SONET equipment increases by an average of 4%, which is less than what was observed for Internet access. The cable network is considerably more sensitive. The cost for CMTSs, routers and SONET equipment increases by an average of 95% and the total cost increases by 6%."⁸⁵
77. Sirbu's work on broadband provided by fixed wireless is also instructive. In a paper presented on this topic Sirbu and his colleagues noted that all network elements in a fixed wireless system, except customer premises equipment, are shared among all the subscribers to the network. He pointed out that a more

average upstream link speed of just 10% that value." Using this data and data derived from their own experience with ADSL service they decided to adopt 20Kbps as the default average residential downstream data rate for Internet access. The authors go on to note that "...there is a large uncertainty in these numbers and that they should be regarded only as a starting point to conduct sensitivity analysis on bandwidth usage." (*Id.* at p. 16)

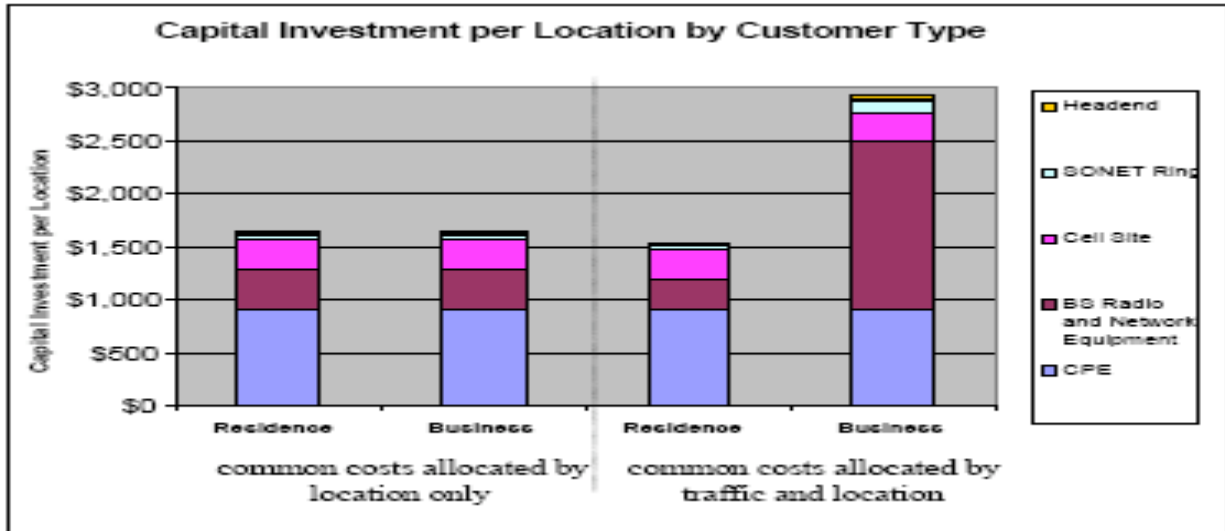
⁸³ *Id.* at 26.

⁸⁴ Newton's Telecom Dictionary, 20th Edition defines CODEC as "Originally CODEC stood for CODer-DECoder, i.e. microprocessor chip. Now the PC industry thinks it stands for COMpression/DEcompression, i.e. an overall term for the technology used in digital video and stereo audio. The original CODEC (still in big use in today's telephony industry) converts voice signals from their analog form to digital signals acceptable to modern digital PBXs and digital transmission systems. It then converts those digital signals back to analog so that you may hear and understand what the other person is saying. In some phone systems, the CODEC is in the PBX and shared by many analog phone extensions. In other phone systems, the CODEC is actually in the phone. Thus the phone itself sends out a digital signal and can, as a result, be more easily designed to accept a digital RS-232-C signal."

⁸⁵ Daniel Fryxell, Steven Lanning, and Marvin Sirbu, "Broadband Access Networks and the Emergence of Voice over IP (VoIP): an Economic Analysis for Cable and ADSL," (1999), at p. 27. Available at www.ini.cmu.edu/ITC/TPRCpaper_final.pdf.

sophisticated approach to allocating these shared costs would be to recognize that some of the equipment is sized based on network traffic and allocate cost according to each location's share of the traffic. Allocating costs in this manner, as Figure 3 illustrates, results in a greater investment per business location.⁸⁶

Figure 3: Capital Investment per Location⁸⁷

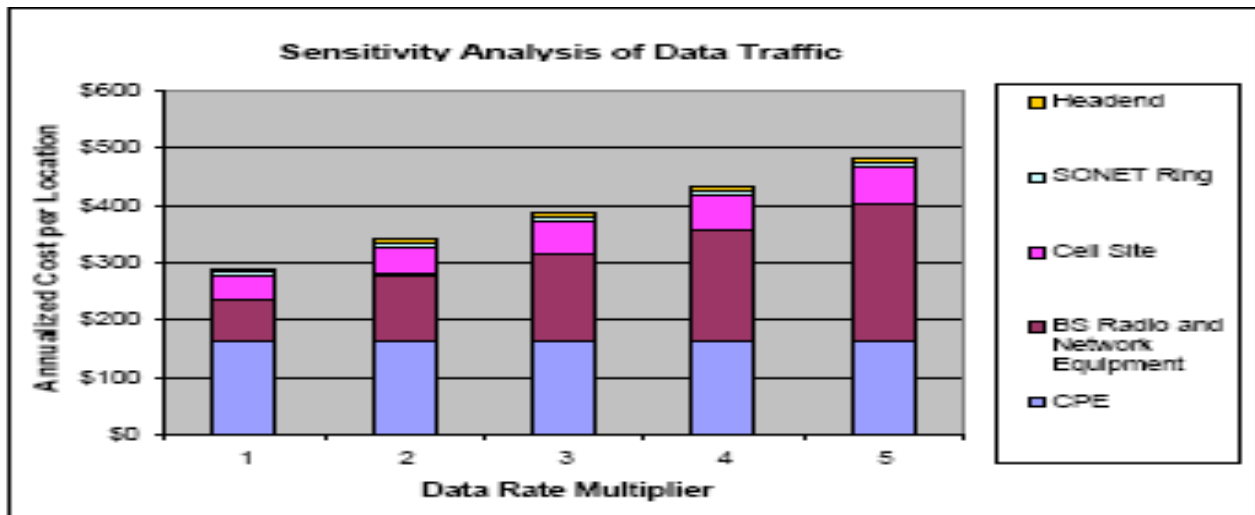
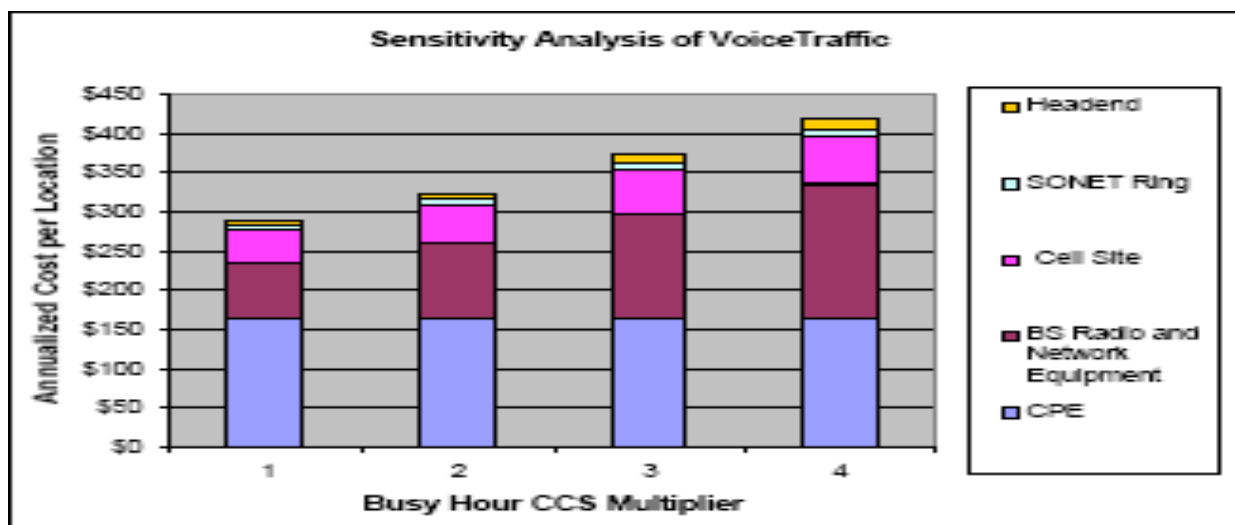


78. The broadband over fixed wireless study went on to find that “[t]otal costs per location increase approximately 17%, 34%, 50%, and up to 67% when data traffic per location increases two, three, four, and five times the default values of 20 Kbps downstream and 2 Kbps upstream per household and 80 Kbps downstream and 20 Kbps upstream per business location. Total costs per location increase 12%, 30%, and 45% when average busy hour CCS per voice line are double, triple, and four times the default values (3.87 CCS/residential voice line and 5.50 CCS/business voice line for Delaware).”⁸⁸

⁸⁶ Wanichkorn, K. and Sirbu, M., “The Role of Fixed Wireless Access Networks in the Deployment of Broadband Services and Competition in Local Telecommunication Markets,” Telecommunications Policy Research Conference, September, 2002 at p. 16. Available at http://www.ini.cmu.edu/ITC/Wanichkorn-Sirbu_TPRC02_v2.pdf.

⁸⁷ *Id.* at p. 17.

⁸⁸ *Id.* at p. 18.

Figure 4: Sensitivity Analysis of Data Traffic⁸⁹Figure 5: Sensitivity Analysis of Voice Traffic⁹⁰

⁸⁹ *Id.*

⁹⁰ *Id.*

79. Another parameter mentioned by the study as having an impact on network traffic flow and so, potentially, on cost as well, was the VoIP channel bit rate. This rate determines the amount of bandwidth usage per voice channel. Study results suggested that every one Kbps increase in this rate per voice channel led to an average increase in cost per location of 0.2%.⁹¹
80. The empirical data gathered by Sirbu and his colleagues is instructive for several reasons:
- ❖ It conclusively demonstrates that the switching related elements of an IP- based network are traffic-sensitive, varying according to bandwidth usage and type of traffic;
 - ❖ For both broadband wireline technologies modeled, increases in the voice codec data rate generated increases in switching element costs that were lower than those caused by increases in the pure data rate, by several orders of magnitude for the ADSL case. However, the studies did not model the effect of video and multimedia service delivery bandwidth usage on switching costs. Arguably, if the effect of video and multimedia services were considered in conjunction with pure data, the impact of increases in the voice codec data rate on usage-sensitive switching costs would be found to be minor in comparison with the impact on usage-sensitive switching costs caused by increases in the usage rates of the other three service categories.
81. These study results demonstrate conclusively that IP-related packet switching elements are highly usage-sensitive and that usage-sensitivity increases in those networks where access is shared by multiple services. Packet switching's usage-sensitivity should not be a surprising finding given the Commission's previous §271 Orders approving usage-sensitive packet switching UNE rates.⁹²
82. As demonstrated in Table 2, below, the DS1 and DS3 recurring rates for packet switching are very high relative to the Analog DS0 trunk port termination rate. Thus the Commission's own review, and acceptance, of submitted cost study results show that the capacity costs on packet switches are hardly trivial.

⁹¹ *Id.* at p. 19.

⁹² See, for example, In the Matter of Application by Qwest Communications International, Inc. for Authorization To Provide In-Region, InterLATA Services in New Mexico, Oregon and South Dakota, FCC 03-81, WC Docket No. 03-11, Released: April 15, 2003, at: ¶73, which noted that the Oregon Commission had accepted Qwest's Switching cost Model; at ¶74, which noted that Qwest had filed revised SGAT rates on December 3, 2002 that became effective as of January 22, 2003—which rates included packet -switching elements;. and, at ¶81, which noted that Qwest had demonstrated that its New Mexico, Oregon and South Dakota UNE rates satisfy the requirements of checklist item two.

Table 2: Commission Approved UNE Packet Switching Rates for Oregon⁹³

	Recurring	Non-Recurring
9.11.6 DS0 Analog Trunk Port		
Unbundled Analog DSO Trunk Port, First Port	\$12.33	
9.11.6 DS0 Analog Trunk Port		
Unbundled Analog DSO Trunk Port, First Port	\$12.33	
9.24.2 Unbundled Packet Switch Interface Port		
DS1	\$144.89	\$223.56
DS3	\$233.12	\$223.56

83. Any remaining doubt as to the importance of bandwidth and quality of service (QoS) assurance management next-generation network of the future should be erased when one looks at the amount of material being written on these subjects recently, not to mention the number of firms that are actively marketing VOIP quality assurance software, bandwidth management services and so on. For example, a recent article on the subject notes suggests that "...a good VoIP call quality management product...add[s] 10% to 20% to the cost of a new VoIP system" but that the expense "is worth the premium". Furthermore, manufacturers such as Nortel are bundling call quality management into their VoIP platforms as well.⁹⁴ This article goes on to point out that the VoIP monitoring/management market hit \$50.7 million in 2004.⁹⁵
84. Bandwidth management and QoS management are inextricably intertwined as better QoS provides more predictable performance, more efficient use of bandwidth, and more detailed control of network resources.⁹⁶ As this article goes on to point out, QoS management requires a detailed understanding of traffic flows at a fairly granular level in order to establish effective QoS policies on each service being provided over a network.⁹⁷ A recent article by the Tolly Group, an independent Telecommunication Services consulting and testing

⁹³ Qwest Oregon SGAT Ninth Revision, Exhibit A, February 21, 2003 at pages 14-15, submitted in WC Docket No. 03-11 by request of the staff of the Federal Communications Commission.

⁹⁴ Susan Breidenbach, "New tools quantify VoIP call quality", Network World, March 28, 2005, available at <http://www.networkworld.com/research/2005/032805voip.html>

⁹⁵ *Id.*

⁹⁶ Curt Cornum, "QoS talking points", Network World, May 16, 2005, available at <http://www.networkworld.com/careers/2005/051605man.html>.

⁹⁷ *Id.*

company, underscores the traffic sensitive nature of many of the services running on the converging IP network by noting that:

Voice quality was directly correlated with bandwidth consumption. Translation: If you are willing to devote more bandwidth to your conversation, you'll get better quality. Vonage is one of the few companies we saw that explicitly acknowledges this trade-off and lets its users decide (although not on a call-by-call basis). Users can log on to their account and ratchet the quality/bandwidth up or down as they please. Sure enough, our tests show that when you squeeze the conversation over a narrower pipe, you pay the price in quality.⁹⁸

85. This shows not only that the traffic sensitive nature of the converging IP network but also indicates just how much more traffic sensitive that network has, and will, become as bandwidth management software becomes more available to end users. What this will require is a whole new level of sophisticated bandwidth management devices on the network edges to handle the varying bandwidth demand being imposed by end-users who will be able to, within the bounds of their respective contracts, vary their bandwidth needs not only by service but on an as needed basis within each particular service category.

V. The Implications for Bill-and-Keep Regimes of the World Wide Move to Calling Party Pays in Mobile Networks

86. At the outset of this discussion, I should point out that the terms Calling Party Pays (CPP) and Receiving Party Pays (RPP) can be a bit confusing. In the interconnection context under analysis here, they more accurately refer to Calling Party's network pays and Receiving Party's network pays. This discussion is relevant to the issues at hand because the ICF Bill-and-Keep proposal is basically a proposal to shift from the current CPP regime that is dominant in the US fixed-line market to the RPP regime that is characteristic of the US mobile market.⁹⁹

⁹⁸ Kevin Tolly, "Pillars of VoIP service - bandwidth, architecture", *Network World*, May 9, 2005, available at <http://www.networkworld.com/columnists/2005/050905tolly.html>.

⁹⁹ Under RPP, a calling party pays the standard price for originating a call on the network to which they belong and the user receiving the call pays the cost of terminating the call on the network to which they belong. Under CPP the party making the call pays the full cost of originating the call on the network to which they belong plus the full cost of terminating the call on the network to which the call recipient belongs. The call recipient pays nothing for receiving the call.

Bill-and-Keep is related to RPP as it allows network operators to charge customers directly to receive calls, in the event the operators want to recover termination-related costs. Arguably then, an RPP billing

87. It is true that under the ICF mandatory Bill-and-Keep proposal the disincentives to usage that exist under RPP, and discussed below, would not exist as those costs would be recovered through the fixed line charge the ICF proposal advocates. However, because the ICF proposal is only a proposal, the discussion of CPP vs. RPP is highly relevant. This is because the Commission could maintain its historical position that traffic-sensitive (TS) costs should be recovered through TS rates and consider the adoption of RPP, allowing for recovery through a MOU rate. As the discussion to follow will demonstrate, adoption of an RPP MOU rate would not make sense, as it is contrary to customer preference and would have a negative impact on internalizing positive network externalities.
88. I will show that Bill-and-Keep is unsound policy since there is no empirical support for the hypothesis that customers prefer, and would be better off with, Bill-and-Keep. Surely, the Commission realizes that this hypothesis is mere speculation, and must be cognizant that such speculation is contradicted by the Commission's own mobile NPRM a few years ago.¹⁰⁰ This hypothesis apparently relies, as discussed above, on seriously flawed economic reasoning that is contained in the Wireline Bureau's Verizon decision.¹⁰¹

A. The Commission's Wireless CPP Docket

89. In October of 1997, the Commission opened an inquiry to examine what effect, if any, a Calling Party Pays (CPP) service option would have on enabling wireless operators to compete more effectively with wireline operators.¹⁰² During the course of its investigations, the Commission found that there was significant evidence that CPP would encourage wireless subscribers to leave

regime could, and probably would, arise as a response to the imposition of Bill-and-Keep system. Stated another way, imposition of a Bill-and-Keep system for carrier interconnection makes it possible for network operators to establish an RPP customer billing regime without the explicit imposition of such a regime by the regulatory authority. Under Bill-and-Keep, as under RPP, the called party would be responsible for paying all costs necessary to terminate the call.

¹⁰⁰ In the Matter of: Calling Party Pays Service Offering in the Commercial Mobile Radio Services, WT Docket No. 97-207 (Wireless CPP Docket), Notice of Inquiry, FCC 97-341, Released: October 23, 1997.

¹⁰¹ In re Petition of WorldCom, Inc., Pursuant to Section 252(e)(5) of the Communications Act for Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia, Inc., and for Expedited Arbitration, CC Docket Nos. 00-218 and 00-251, DA 03-2738, Memorandum Opinion and Order (August 29, 2003). Virginia Arbitration Order (Virginia Arbitration Order).

¹⁰² In the Matter of: Calling Party Pays Service Offering in the Commercial Mobile Radio Services, WT Docket No. 97-207 (Wireless CPP Docket), Notice of Inquiry, FCC 97-341, Released: October 23, 1997. at ¶1.

their handsets on instead of keeping them turned off to avoid paying for calls they did not want to receive,¹⁰³ increase the use of wireless services, and benefit wireless consumers concerned with the ability to control their monthly telecommunications expenses.¹⁰⁴ In addition, the Commission's investigation noted that studies indicated that customers felt that CPP was a more fair and equitable approach than Receiving Party Pays (RPP).¹⁰⁵ The Commission eventually terminated its inquiry into the CPP. In terminating the proceeding, the Commission found that CPP billing was a CMRS offering within the meaning of section 332(c)(3) of the Communications Act of 1934, as amended, that many CMRS carriers were offering plans that gave subscribers many of the benefits the Commission had seen in CPP billing and that, as a result, it was not clear that regulatory intervention by the Commission was necessary.¹⁰⁶

90. What is remarkable about the Commission's recent history is that it illustrates the abrupt about face the Commission has made on this issue, as demonstrated in the current proceedings. Four years ago, the Commission found that "CPP holds the potential for making mobile wireless services more effectively available to large numbers of customers who do not subscribe today or who strictly limit their usage, and to spur further competition by offering a different service option that may be particularly attractive to low-income, and low-volume and mid-volume consumers"¹⁰⁷, but declined to rule on the issue because of the diversity of opinions regarding it. In the current proceeding, without any citation to empirical evidence and despite the diversity of opinions on the issue, the Commission has apparently decided that Bill-and-Keep (a receiving party pays regime by another name) is more efficient and more aligned with customer preferences.¹⁰⁸ This flip-flop by the Commission is

¹⁰³ In making this finding the Commission noted that both the calling party and the called party would benefit from CCP. Calling parties would benefit because of being able to complete calls to wireless customers who might otherwise have their phones turned off. Called parties would benefit as they would no longer have an economic incentive to avoid or minimize the acceptance of calls. Additionally, the Commission noted that wireless customers would be more likely to increase their phone usage under CCP as they would no longer have to budget, and pay for, incoming calls. *Wireless CPP Docket, Declaratory Ruling and Notice of Proposed Rule Making*, FCC 99-137, Released: July 7, 1999 (*Wireless CPP Docket Declaratory Ruling*), at ¶3 and ¶24, respectively.

¹⁰⁴ *Wireless CPP Docket Declaratory Ruling*, at ¶3. The Commission also found that one of the problems with implementing CPP was figuring out how to let an originating party know that they were paying for the call—this is not at issue with current wireline calls.

¹⁰⁵ *Wireless CPP Docket Declaratory Ruling*, at ¶22.

¹⁰⁶ *Wireless CPP Docket, Memorandum Opinion and Order on Reconsideration and Order Terminating Proceeding*, FCC 01-125, Released: April 13, 2001, at ¶¶23-24.

¹⁰⁷ *Wireless CPP Docket Declaratory Ruling*, at ¶3.

¹⁰⁸ See generally, *Developing a Unified Inter-carrier Compensation Regime*, Notice of Proposed Rulemaking, FCC 01-132, CC Docket No. 01-92, Released April 27, 2001 at ¶¶37-97.

surprising in light of the evidence that customer preferences, as revealed by consumer behavior, clearly demonstrate that Calling Party Pays is the preferred choice of consumers when they are given the opportunity to choose.

B. Evidence From Other Countries And The U.S. Mobile Market

91. Early multi-country research carried out by Coleago indicates that wireless users typically know their average monthly bill and ration calling behavior accordingly. Under CPP, users can spend more on making calls since they are not paying for incoming calls. Furthermore, with the cost barrier on receiving incoming calls removed, wireless users have an incentive to circulate their mobile numbers more widely, thus increasing the amount of incoming calls.¹⁰⁹ This effect was demonstrated empirically by a 1994 AT&T market trial study of CCP. This study showed that inbound call minutes for wireless customer who converted to CPP “increased from 26% of total minutes to 32% within approximately half a year”.¹¹⁰ These AT&T trials, “which allowed a direct comparison of mobile party pays and calling party pays in the same market, showed:

- ❖ CPP will increase inbound call minutes.
- ❖ CPP will increase revenue per subscriber.
- ❖ CPP will expand the cellular market by making cellular more affordable to potential customers.
- ❖ CPP will increase usage of marginal customers.
- ❖ CPP will retain customers who are sensitive to the cost of cellular service.”¹¹¹

92. Even more compelling is the case of Mexico, which, as noted by the Commission,¹¹² switched from a wireless RPP to a CPP regime.¹¹³ CPP

¹⁰⁹ Stefan Zehle, Calling Party Pays Mobile Tariffing: an International View, Coleago Consulting Ltd., prepared for the COFETEL Guadalajara Forum, April 1997 at p. 4.

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² *Wireless CPP Docket Declaratory Ruling* at ¶24.

¹¹³ In Mexico RPP worked as follows: “[T]he mobile networks were required to pay the fixed network a charge for terminating calls on the fixed network. That charge was US\$ 0.055 per minute. However, traffic generated on the fixed network and terminated on the mobile networks did not give rise to any termination charge paid to the mobile networks. Moreover, the fixed network was authorized to receive (rather than to pay) a call origination charge of US\$ 0.036 per minute for traffic originating on its network and terminated on the mobile networks. Furthermore, the fixed network charged its subscribers a measured local service rate equivalent to US\$ 0.138 per call in 1993.”(Arturo Briceño,

availability in Mexico commenced May 1, 1999. At that time all existing users were automatically moved to CPP unless they wanted to stay on RPP, in which case they had to ask for a new number; only 5% of existing users took that option.¹¹⁴ Since 1999, the number of wireless users in Mexico has gone from 4.5 million to nearly 40 million lines today. What is more, while RPP still remains an option for Mexican wireless customers, the vast majority of those customers choose the CPP wireless plan. Currently wireless customers who choose an RPP calling plan are estimated to be less than 1% of total wireless subscribers.¹¹⁵

93. Even more interesting is the change in traffic patterns that occurred after CPP was introduced in Mexico, as illustrated in Table 3 below.

Table 3: Minutes of Use Per Month by a Mobile Subscriber in Mexico¹¹⁶

	Before CPP March 1999	After CPP December 1999	Var.%
1. Outgoing mobile traffic	89	83	-7%
2. Incoming mobile traffic	73	94	29%
3. Total mobile traffic (1)+(2)	162	177	9%

94. It is noteworthy that fixed to mobile traffic increased by 29 percent, in spite of a concomitant increase in the effective fixed-to-mobile tariff of 250 percent!¹¹⁷ Arguably, this demonstrates that callers on the fixed network derived “greater benefit” from placing calls to customers on the wireless network -- since they were willing to pay a large premium for doing so.¹¹⁸

Fixed-Mobile Interconnection; The Case Of Mexico, 2000, available at http://www.itu.int/osg/sec/spu/ni/fmi/case_studies/, at p. 12.)

¹¹⁴ From a communiqué sent by Lester Olvera García Benito, Director General de Estudios Económicos y Regulatorios, Comisión Federal de Telecomunicaciones (COFETEL), on April 27, 2005.

¹¹⁵ *Id.*

¹¹⁶ Arturo Briceño, *Fixed-Mobile Interconnection; The Case Of Mexico*, 2000, available at http://www.itu.int/osg/sec/spu/ni/fmi/case_studies/, at p. 27.

¹¹⁷ *Id.* at p. 28.

¹¹⁸ Mr. Briceño notes another reason which may have been a contributing factor to the willingness of wireline subscribers to pay such a high premium for calling wireless customers. “Before CPP, a mobile subscriber used to keep off his mobile set at certain times to avoid receiving unwanted calls that had to be paid by him for receiving the call. Thus, fixed subscribers were not able to complete all their calls to mobile subscribers because mobile users used to keep off their telephones. So there was a degree of “repressed” traffic from fixed-to-mobile subscribers. With the introduction of CPP, the fixed subscriber is

95. I believe the AT&T study and the Mexico example illustrate that there is a strong economic argument for a CPP regime where fixed line callers pay wireless termination charges. This argument is supported by the fact that a CPP is associated with additional benefits received from the increase in wireless subscribers and from the increased rate of fixed-to-wireless call completion. This belief is reinforced by the data from Mexico which shows that fixed wireline customers were not only willing to pay wireless termination charges that were 250% higher after CPP was introduced, but that they actually increased the amount of traffic sent to the wireless network after the introduction of CPP.¹¹⁹
96. The empirical data presented in the AT&T study and the Mexico example is in sharp contrast to the speculations on the benefits of bill-and-keep put forth by Staff in Appendix C of the FNPRM¹²⁰, which in turn are repetitions of speculations by parties to this docket. Reliance on such speculation by parties is also in sharp contrast to the hard empirical data the Commission utilized during the course of its deliberations in the mobile NPRM. This data, I might point out, resulted in the Commission taking a decidedly positive view of the ability of CPP termination charges to capture positive network externalities.¹²¹
97. A key failure of a Bill-and-Keep regime is that it does not recognize that the called party may often have a much lower willingness to pay than the calling party. If the caller has a higher willingness to pay, then termination charges would only be efficient if set in a way that calling parties bear the bulk of the costs of the networks.
98. The Mexican experiences with CPP demonstrate that a CPP regime is more likely to internalize positive network externalities between calling and called parties due to the fact that the externality flowing from the called party to the calling party, in the case of fixed to wireless calls, is significantly larger than that flowing from the calling fixed line party to the called wireless party, as

willing to pay a higher price for a call than before, but now the call can be successfully completed with the mobile subscriber since there is no need for keeping off mobile telephones anymore.” (Briceño at footnote 38.) This explanation also supports the hypothesis that fixed wireline customers derived greater benefit under CPP from calling wireless customers.

¹¹⁹ Of course I believe that a similar economic argument applies in the case of wireless-to-fixed calls. That is, I believe that parties calling from a wireless network to a fixed line network should also pay fixed wireline termination charges due to the benefits they receive from being able to place calls to the wireline network from wherever they happen to be.

¹²⁰ *Developing a Unified Intercarrier Compensation Regime, Further Notice of Proposed Rulemaking*, FCC05-33, CC Docket No. 01-92, Released March 3, 2005 at Appendix C, p. 99-100.

¹²¹ *In the Matter of: Calling Party Pays Service Offering in the Commercial Mobile Radio Services*, WT Docket No. 97-207, *Declaratory Ruling and Notice of Proposed Rule Making*, FCC 99-137, Released: July 7, 1999, at ¶3.

demonstrated by the increased fixed-to-wireless traffic flows despite the high premium imposed on these types of calls. Before the change to the Calling Party Pays billing plan there were fewer mobile customers and those that existed kept their mobile numbers as secret as possible and, according to anecdotal evidence, frequently had their phones turned off so as to avoid the risk of paying for unwanted calls. Without the change to CPP, there would have been fewer mobile customers and a lower chance of reaching those mobile subscribers that did exist. Thus fixed line callers would have had fewer opportunities to contact people who were away from their landline telephone, even though they were demonstrably willing to pay a premium for doing so.

99. Oftel¹²², now Ofcom, reached a similar conclusion when it had occasion to examine interconnection rates back in 2001. At the end of an intensive investigation of CPP vs. RPP Oftel concluded “Whilst RPP is in theory attractive in terms of increasing competition in termination, its benefits are likely to be outweighed by adverse effects on economic efficiency, consumer resistance and the initial costs of implementation.”¹²³
100. Tellingly, the agency went on to note: “...users would react strongly against having to pay to receive calls. Oftel would have a hard job explaining that overall it was in their interests to pay for such calls when previously they received them for free.”¹²⁴
101. On a final note I would like to point out that since 1991 there has been no move from CPP to RPP in any country, while during the same period 27 countries shifted from RPP regimes to CPP regimes.¹²⁵ This trend would seem to be a strong indicator that RPP regimes have been found to be sorely deficient by those countries that initially experimented with them.

VI. The Commission’s Suggestion That Caller ID Be Used To Avoid Unwanted Termination Charges Is Inefficient And Unduly Burdensome To End-Users

102. In order for consumers to be adequately informed and make rational choices under Bill-and-Keep, they would need to know before picking up the receiver for

¹²² Oftel stands for the Office of Telecommunications, the telecommunications regulatory authority for the United Kingdom.

¹²³ “Receiving Party Pays compared to Calling Party Pays”, Oftel 19.4.02 – 02, at ¶6. Available at, http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/rpp_cpp190402.pdf

¹²⁴ *Id.* at ¶12.

¹²⁵ Stefan Zehle, “CPP Benchmark Report”, Coleago Consulting Ltd, February 23, 2003, p. 2, Figure 1.

any incoming call if it is an off-net or on-net call since the former would be more expensive due to the termination charges to be imposed by the called party's provider and because interoffice calls are more costly to provide than intraoffice traffic. However, this opens a Pandora's box since it would no doubt cause significant customer confusion to be presented with this information as the phone is ringing or to have additional line items and/or monthly bills explaining termination charges after the fact.¹²⁶

103. The proponents of Bill-and-Keep need to explain why if incoming calls were so desirable why do so few consumers have 800 numbers that would encourage incoming calls? As shown in the Mexican example, the answer must be that consumers prefer a Calling Party Pays system in order to minimize unsolicited incoming calls -- moreover, some are even willing to pay a premium to further reduce incoming calls using Caller ID services.
104. The FNPRM proposes that the problem of people having to pay for unwanted incoming calls can be solved with caller number identification.¹²⁷ However, I estimate that only about 35 to 40% of subscribers have Caller ID today. Hence a substantial additional portion of the population would have to go buy Caller ID at a non-trivial cost in order to solve the problem of avoiding unwanted incoming calls as noted in the FNPRM. As can be seen from Table 4, the average cost would be about \$7-10 per month in most cases.

¹²⁶ The case of credit cards is illustrative here. Cardholders pay an annual fee and interest and finance charges on purchases. There is no hidden and uncertain charge like an "interchange fee" since this is handled by the Credit Card Associations, and hence the system is simple, transparent, and widely used with no "additional" and unexpected (or unpredictable to estimate) charges levied at the end of the month, unless the customer violates some contract provision (through late payment, over-limit balance, etc.).

¹²⁷ FNPRM ¶25; and page 101.

Table 4: Estimates of Monthly Costs for Caller ID Services in Selected States

State	Caller ID With Privacy (1)	Caller ID Number Only (2)	Caller ID (3)	Caller ID With Privacy (1)	Caller ID Number Only (2)	Caller ID (3)
	<i>Residential</i>			<i>Business</i>		
Arizona	9.45	5.00	5.00	10.45	7.45	7.45
Colorado	9.95	6.95	6.95	10.95	6.95	7.95
Delaware		6.50	7.50		6.50	9.50
Idaho (North)		5.50	5.95		5.50	7.95
Idaho (South)	9.95	6.95	6.95	10.95	6.95	7.95
Iowa	9.95	6.95	6.95	10.95	6.95	7.95
Maine			7.50			7.50
Maryland		6.50	9.50		8.50	9.50
Massachusetts		6.50	7.50		7.50	8.36
Minnesota	9.95	6.95	6.95	10.00	7.50	10.00
Montana	9.95	5.50	5.95	10.95	7.50	7.95
Nebraska	9.95	6.95	6.95	10.95	7.50	7.95
New Hampshire		4.95	7.50			8.50
New Jersey		6.55	7.50		8.50	9.50
New Mexico	9.95	6.40	6.50	10.95	7.50	7.95
New York		7.50	7.99		8.50	9.50
North Dakota	9.95	6.95	6.95	10.95	7.50	7.95
Oregon	9.95	5.00	5.00	10.95	7.50	7.95
Rhode Island		5.69	7.75		5.69	7.75
South Dakota	9.95	6.95	6.95	10.95	7.50	7.95
Utah	9.95	6.95	6.95	10.95	7.50	7.95
Vermont		5.35	6.35		5.35	6.35
Virginia		6.50	7.50		8.50	9.50
Washington	9.95	5.50	5.95	10.95	7.50	7.95
Washington DC		6.50	7.95		8.50	9.50
West Virginia		6.95	7.95		8.50	9.50
Wyoming	9.95	6.95	6.95	10.95	7.50	7.95

Source: Data extracted from April 2005 RBOC tariffs.

(1) Includes the Caller Identification - Name and Number functionality and, in addition, callers placing a call from a private or blocked telephone number hear a series of prompts asking them to unblock their line or record their name for delivery to the called party. Callers placing a call from an unidentified number are asked to record their name for identification purposes and to hold the line.

(2) Allows for the automatic delivery of a calling party's telephone number including nonpublished and nonlisted telephone numbers.

(3) Allows for the automatic delivery of a calling party's name and telephone number including nonpublished and nonlisted telephone numbers.

105. The cost to a retail customer for Caller ID is greater than the costs associated with call termination. The Commission has assumed that a high-volume user receives approximately 1,570 minutes of incoming traffic each month.¹²⁸ If the cost of terminating a minute is on the order of \$0.005 or less, then the terminating cost of all incoming traffic for a high-volume user is in the range of $1570 * \$0.005 = \7.85 . It does not make economic sense for a customer to pay \$7 per month for Caller ID if the call saving of blocking all calls is about the same. In fact, if Caller ID will be used to block only 20% of the minutes then the cost of Caller ID exceeds the savings by a multiple of four and half times. This ratio indicates that relying on Caller ID as a means to legitimize Bill-and-Keep will only increase network inefficiency.

VII. The Appropriate Reciprocal Compensation Rate Structure

106. In light of the significant market developments since the adoption of the access charge and reciprocal compensation rules, the FNPRM suggests there are three fundamental problems with the existing intercarrier compensation regimes that must be re-examined because they distort the competitive process:
- ❖ Existing regimes invite regulatory arbitrage because they are based on jurisdictional and regulatory distinctions, not economic or technical differences between services.¹²⁹
 - ❖ Existing regimes allow carriers to shift network costs to subscribers choosing competing networks.¹³⁰
 - ❖ Existing regimes are based on a “calling-party-network-pays” (CPNP) approach even though developments in the ability of consumers to manage their own telecommunications services undermine the premise that the calling party is the sole cost causer and should be responsible for all the costs of a call.¹³¹
107. The FNPRM avers that these developments compel the Commission to move toward a new, unified intercarrier compensation regime that is better suited to a market characterized by competition among multiple types of carriers and

¹²⁸ In the Matter of Application of Verizon Pennsylvania Inc., Verizon Long Distance, Verizon Enterprise Solutions, Verizon Global Networks Inc., and Verizon Select Services Inc. for Authorization To Provide In-Region, InterLATA Services in Pennsylvania, CC Docket No. 01-138, Memorandum Opinion and Order, September 19, 2001, Footnote 252, Page 41.

¹²⁹ FNPRM ¶15.

¹³⁰ FNPRM ¶16.

¹³¹ FNPRM ¶17.

technologies. The Commission states that it generally agrees with commenters that any new approach should promote economic efficiency;¹³² be competitively and technologically neutral; and in addition, provide regulatory certainty.¹³³

108. Although I disagree with the Commission's characterization of some of the reasons why the existing reciprocal compensation regime must be overhauled (particularly numbers 2 and 3 above), I do agree that the new structure should promote economic efficiency; be competitively and technologically neutral; and provide regulatory certainty. For these reasons, I propose that the Commission adopt a capacity-based reciprocal compensation rate structure where carriers compensate firms they interconnect with based on the cost of the incremental capacity they require at the busy hour.
109. This type of rate structure is supported by economic literature where it has been argued that:

...in industries where the primary driver of the cost of a network is the network's capacity to carry traffic at peak times, it often makes sense to base the access prices on the capacity allowed to competitors and not on usage. Capacity-based pricing is a form of multipart tariff, with the fixed part of the tariff proportional to the amount of capacity to which the downstream competitor is granted access.¹³⁴

110. This proposal is also consistent with the proposal of the Expanded Portland Group¹³⁵ (EPG) and other commenters.¹³⁶ The Commission could adopt such a capacity-based pricing system at the end of the five-year phase-down period proposed in NASUCA's intercarrier compensation reform plan.
111. Since carriers typically interconnect at DS-1 level (or a multiple thereof), it would be most efficient if the Commission adopted a reciprocal compensation rate structure that reflected the economic and engineering parameters of these connections.

¹³² FNPRM ¶31.

¹³³ FNPRM ¶33.

¹³⁴ The Regulation Of Access Services (with a focus on telecommunications) OECD workpaper; November 7, 2003; page 70. Available at: <http://www.oecd.org/dataoecd/23/61/18645197.pdf>

¹³⁵ Regarding small carriers, however, I agree with the Expanded Portland Group that there will be a need to maintain per minute rates (e.g., shared transport). See EPG Comments, In the Matter of Developing a Unified Intercarrier Compensation Regime, November 2, 2004 (CC Docket #01-92) Page 31.

¹³⁶ See, for example, AT&T Comments, In the Matter of Developing a Unified Intercarrier Compensation Regime, August 21, 2001 (CC Docket #01-92) Page 23.

112. By relying on capacity charges, rather than a per minute rate, the Commission would be able to avoid the problems previously associated with the per minute rate scheme, primarily, that per minute reciprocal compensation rates may give carriers the opportunity and incentive to leverage their position by seeking end users with disproportionately more incoming traffic. This is avoided under a capacity-based pricing regime because capacity charges represent a cost-based rate that reflects the costs incurred in terminating traffic. There is no charge for terminating off-peak traffic,¹³⁷ but unlike the Bill-and-Keep proposals, there is a charge for terminating traffic during the peak hour. This results in an economically efficient wholesale pricing structure, a claim that cannot be made by the proponents of Bill-and-Keep.¹³⁸
113. Capacity charges properly reflect cost causation, and are an effective and efficient way for one carrier to pay another for the wholesale cost of interconnecting with another carrier's network. The recovery of these wholesale capacity charges in the retail rates of each carrier's customers should be left to the judgment of each carrier. Such a result is reasonable and pro-competitive.

VIII. Conclusion

114. The Commission is considering whether to adopt Bill-and-Keep as the foundation for its access and interconnection charging policies. I have shown that the Commission's consideration is flawed for a number of reasons.
115. The Commission offers little evidence to support its proposition that the costs of call termination are becoming increasingly non-traffic-sensitive, and thus that a Bill-and-Keep regime would be better justified. I have shown that the Wireline Bureau's conclusion regarding the degree to which circuit switches are traffic sensitive was wrong, and that the available evidence suggests that the network is becoming increasingly traffic-sensitive. I have shown that the traffic-sensitive costs are significant, and therefore a significant inefficiency would result from recovering the traffic-sensitive costs through a flat-rate end-user charge.
116. In summary, Bill-and-Keep should not be adopted because it would impede the efficient flow of communications and could lead to a rate structure that is divorced from the underlying cost structure of the industry.

¹³⁷ In the Local Competition Order the Commission noted that the Washington Commission stated that "a flat rate based upon cost of providing capacity at peak load is possibly the most economically correct pricing mechanism; off-peak usage then is at virtually zero cost." LCO ¶800.

¹³⁸ This mechanism also eliminates the need for regulators to determine if the calling or called party benefits from a call (or any exchange of traffic, for that matter).

Appendix A: A Hypothetical Example Of The Effects Of Bill-And-Keep On Network Utilization

1. The following example illustrates the inefficiencies that Bill-and-Keep could lead to in a real world context. Suppose that a large business currently uses special access to connect a PBX in its office in New York with its PBX in Los Angeles. When renting the special access line the customer is paying for the DS1 equipment at the two end (class 5) central offices. The DS1 equipment is used to ship the telecommunications traffic from the class 5 office to the IXC point-of-presence. Each of the 24 circuits on the dS1 equipment typically handles about 20 busy-hour CCS (one-hundred calling seconds).
2. Under Bill-and-Keep, the end user might shutdown its special access lines because it can avoid paying for the cost of the DS1 equipment in the central office. The end user will instead run the traffic over the same lines that are used for exchange traffic. It could be economical to shift the long-distance traffic on to the public switched network because the retail customer will only have to pay for the average cost of traffic-sensitive equipment and not for the higher level of traffic that it generates. Presumably, the retail customer will only have to pay the average cost because it is likely that the LECs will not be monitoring and billing for terminating traffic. Thus, the additional traffic that is transferred from special access to the switched network will cause the LEC to buy more DS1 equipment for its switch, but the cost of the equipment will be shared between all voice switched customers.
3. The end-user may also have to buy additional trunks to carry the long-distance traffic. Although it is possible that the additional cost of using the loops will be less than the current cost of the special access arrangement, it is impossible to know with certainty that the shift in costs will lead to a shift of traffic back onto the public switched network. In order to know the efficiency gains and losses, the Commission would have to undertake the kind of analysis undertaken by Brock in the 1980s.¹³⁹ Brock's analysis included consideration of the cost of alternative technologies and demand elasticities. It is striking that in the Commission's current undertaking there is an absence of any sign that it is undertaking the type of sensible economic analysis that was so important when it initiated access reform in the 1980s.

¹³⁹ Brock, see footnote 6.

State of: **MASSACHUSETTS**

County of: **MIDDLESEX**

The undersigned, being of lawful age and duly sworn on oath, hereby certifies, deposes and stated the following:

I have caused to be prepared the attached written affidavit in support of the National Association of State Utility Consumer Advocates in the CC Docket No. 01-92

This affidavit is true and correct to the best of my knowledge, information, and belief.

Further Affiant sayeth not.

Affiant



Subscribed and sworn to before me this 23rd day of May, 2005 in Newton Massachusetts.



OLENA PANTYUKHINA
Notary Public
Commonwealth of Massachusetts
My Commission Expires 6-16-2011